GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

(Founded in 1849 as the "Journal of Gas Lighting.")

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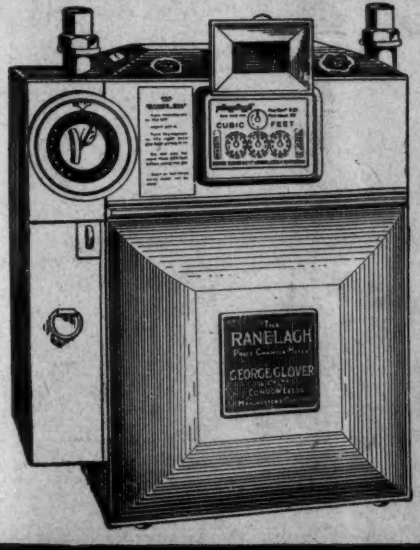

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VOL. CLXIII., No. 3147.] WEDNESDAY, SEPTEMBER 5, 1923. [75TH YEAR.

EDITORIAL NOTES.

Gas-Consuming Appliances in the Home.

THE Committees of the various Gas Associations are engaged in the preliminary work necessary to the opening of the new session. The annual meeting of the North British Association of Gas Managers will be held to morrow; the Eastern Counties District Association will be meeting next week; and the North of England Association the following week. The Wales and Monmouthshire Junior Association held a meeting less than a fortnight ago; and the Councils of the other junior organizations are busy on their programmes. The same applies to the Salesmen's Circles; and more of these will be meeting during the next six or seven months than was the case during last winter and spring. There will be, on Sept. 22, the Joint Meeting of Salesmen (in which it is hoped the junior organizations will have part) in Birmingham during the run of the National Gas Exhibition. This success-assured effort of the Midland gas undertakings will wind-up with the annual conference of the British Commercial Gas Association. These events are important, but only introductory to a vast activity during the coming months; and this activity will be reflected in our pages through the reports, articles, and illustrations, which will be given as fully as opportunity will allow and value justify.

The opening of a new session of work induces us to make a suggestion. Looking over the proceedings of the Associations whose members are engineers and managers, or embryonic chief officers, one is struck by the preponderance of papers and discussions devoted to manufacturing and distribution subjects, and the rarity of the occasions on which the engineers and managers at their meetings enter (so to speak) into the houses, factories, and business establishments of the customers of their undertakings, and confer together as to what exists there, and how best to secure the highest standards of efficiency in the use of their primary commodity. We may be told that this part of the work of the industry is now sufficiently covered by the "B.C.G.A." and the Salesmen's Circles. There is admittedly a great improvement in the amount of consideration given to the subject; but there is a wide distinction between the work of the various organizations. The duties of the "B.C.G.A." lie mainly in propaganda work; while the functions of the Salesmen's Circles are education and the spreading of information among a special and important section of the staffs of gas undertakings. The salesmen, however, have nothing whatever to do with the shaping of policy; and an advancing policy is required in the utilization of gas just as much as in connection with the manufacture of gaseous therms and their sale. Between the sale of potential heat and its utilization in those ways which will produce the greatest effect and efficiency, there is a gulf. This gulf requires narrowing and shallowing to the maximum extent. To recommend changes to secure this, and to mould policy in this relation, is the work of the executive head of every undertaking. Therefore we should like to see at the District Association meetings this coming session more consideration given as to what should be done to help the consumer to secure the highest possible efficiency from gas. The gas engineer does not need exhibitions to make him cognizant that the efficiencies of gas appliances to-day can far surpass those of many appliances—lighting, heating, and cooking—that are in use in his area of supply. It is the public who require to be shown these things, in order to induce those who do not use gas for the purposes demonstrated to do so, and to get them to buy the modern appliances. But the majority of householders do not buy gas-consuming appliances; they hire them. And the inspection of the newer appliances creates the desire to become possessed of their like, and to realize their economies and conveniences. The chief gas official must not overlook this tendency in public desire, and the inevitable dissatisfaction that must arise from one customer having an appliance which gives him a lower economy and efficiency than that of a neighbour or friend. Another tendency, or rather trait, of which sight must not be lost is the disposition of a large number of consumers to make no complaint of causes of dissatisfaction; and these are the people whom the competitors find the easiest to persuade to go over to them.

Now both these tendencies of the times in connection with the utilization of gas have got to be met in the interests of the industry, and of every individual undertaking therein. There is no escaping them. Neglect will do no good; it must assuredly do harm, and that incrementally. We may boast of our net increases of business. The net increases of business would be larger if the losses were reduced. And where there is neglect at the utilization end, the losses will tend to grow in greater proportion than in those places where there is no neglect, but an earnest endeavour to ensure the consumers the highest efficiency. Of course, one cannot expect gas undertakings to replace old hired appliances, unless worn-out or obsolete; but much could be done to secure with them higher efficiencies. Where there is the will, there is a way. In connection with lighting, Dr. Carpenter and others have urged upon the responsible administrators and executive officers and advisers of gas undertakings the need of operating to higher standards of efficiency in the houses of gas consumers. Mr. T. A. Canning, in his Presidential Address to the Wales and Monmouthshire Junior Gas Association, stated that gas lighting was not a thing of the past; its possibilities were greater to-day than ever before. That is true. But of the intrinsic qualities of gas, use is not made in the industry to the extent that it should be. We possess, and yet many ignore the possession. The competing light has noxious defects. Nevertheless, the purveyors of electricity make the best possible use of the facilities offered by their light, but say nothing publicly as to its defects in respect of light quality and eye-harming glare, while advertising well the minor troubles experienced with gas lighting. But that is in the realm of competition. Our point has to do with existing gas appliances—the ancient and the obsolete compared with the modern and highly efficient, to which latter, and not to the former, we have to look for the industry's stability and increasing prosperity.

The North British Association are examining into this matter of the effects of obsolete and decrepit gas-fittings upon the lighting load. The matter was brought before them at their last meeting by Mr. E. Edison Stones, the Assistant General Manager of the Glasgow Corporation Gas Department; and it will be remembered that he showed the members some ill-conditioned examples of lighting equipment which were found in one area of the city, and which convinced the Department that they must be up and doing to eradicate them. There is no need for their existence. They are only paving the way for loss of gas business in favour of the competitor; anyway, while such inefficiency continues, it must retard, and do considerable injury to, the gas business. At the meeting of the

Association to-morrow, the matter is to be discussed; and Mr. James Bell and Mr. John Wilson will introduce it by supplementing what, at the previous meeting, Mr. Stones had to say—and said well, without the slightest hesitation in revealing what had been found in the city. Then at the meeting next week of the Eastern Counties Gas Managers' Association, Mr. J. R. Bradshaw will be dealing with light, heat, and power, and making an appeal for a broader outlook. We are glad to see this attention to a vital question at meetings of gas engineers and managers.

It is not only in connection with lighting that inefficiency is found. It is present in all the other lines of gas utilization; and yet in every one new standards of efficiency obtain to-day in the modern types of appliances. This is true particularly of gas-fires and the hotplates of gas-cookers. What is to be done? Fires and cookers cannot be scrapped indiscriminately; but we would suggest that a beginning should be made (where it is not already part and parcel of the system of work of an undertaking) in converting old cookers and fires so as to produce as closely as possible the new efficiency standards. The raising of the level of efficiency should not be confined to the production of therms. The Greenock Corporation Gas Department have for some years been notably progressive; and we understand that they have now set-out to provide all old types of gas-cooking appliances with the more efficient hotplates of these times. That is the way to preserve custom, and to expand it. We know that much is being done by many undertakings in the way of maintenance; but there is something more than mere maintenance required in many districts. And that "something" is modernization. It is a duty not only to the consumers, but to the undertaking. For all appliances on hire, rents are charged, and profit is made on the gas consumed by them. In all well-ordered undertakings, depreciation has also been provided, and sinking fund in the case of municipal undertakings. For these reasons alone, the question of cost ought not to be a deterrent to modernization. The expenditure involved would also be spread over a considerable period; and the capital value of the property of the undertakings in consumers' houses would be augmented. There is good cause for a campaign—local and general—against inefficient and obsolete gas appliances in very many supply areas. The American Gas Association have been counselling the gas undertakings of the United States to adopt the policy of replacing inefficient by efficient gas appliances, or of modernizing the former by introducing new burners and other parts. They realize that indifferent appliance conditions will not influence sales and new custom, but that they are detrimental to development, and are reasons for the loss of custom—more so, we venture to think, than the virtues of the competitors. The Board of Trade Departmental Committee on Therm Charges took into consideration the question of inspection of gas appliances in consumers' houses; and, in their opinion, if this were done, it would tend to raise the general standard of the appliances, many of which now on consumers' premises, they recognized, were in varying degree below the standard of performance of modern types.

These are all matters that come within the province of policy. They affect the gas salesman; but while he can make representations, he cannot direct policy in respect of the carrying-out of the improvements to which attention is called in this article. They are questions for the chief engineers and managers to consider, bringing the results of their deliberations before their directors or committees. It is for this reason that we should like to see the District Associations take up this subject seriously during the present winter season. A definite campaign is pressingly needed in this direction; and the sooner it gets into full swing the better. Are the interests of gas undertakings going to be served by the perpetuation of inefficiency? Our fear is that inefficiency will not only kill itself, but in the process destroy paying gas business. The times and their conditions demand from those who fashion gas policy new conceptions of requirements and obligations.

A Useful, but in One Respect Unjust, Act.

FIVE years ago the Statutory Undertakings (Temporary Increase of Charges) Act was passed. Its operation and powers came to an end on Friday last. It does not seem anything like five years ago that the gas industry was appealing to Parliament to save it from a condition of things created by legislative authority—such as the sliding-scale and maximum prices—that was never intended to fit such an economic collapse as that which came about through a war of unprecedented gravity and dimensions. Nor does it seem so long ago that Parliament, convinced of the financial peril which the gas industry had reached, condescended to step in to do something to save it from slipping to the very bottom of the precipice so far down which it had fallen, and suggested a ledge, and a very narrow one, to stop the final fall, which, as events proved, could not in a number of cases have otherwise been averted. The sense of justice which animated Parliament in those times was spoilt by the unfair limitation applied. It was at first thought that, if such undertakings were granted an increase of their standard or maximum prices, dividends should be restricted to 50 p.ct. of the standard or maximum; but eventually a limit of three-quarters was conceded, which was better, but still mean in the circumstances. Thus, on a 3½ p.ct. standard dividend stock, the proprietors in those times of stress, heavy expenses, and high income-tax for every individual, were allowed a dividend of £2 12s. 6d., or on a 4 p.ct. standard dividend stock, 3 p.ct. Nothing would move Parliament to alter this miserable state of things; and so the industry suffered stock and share depreciation, and that deplorably. Nevertheless, the Act had one beneficial effect; it prevented the worse crash which would have come about but for its intervention.

Now this memorial of hard days has, among many others, come to an end; and Parliament has since made amends for their then legislative action, which was good in principle but bad in terms, by the passing in 1920 of the Gas Regulation Act. Those undertakings (they must be few) that continued to operate under the 1918 Act until its powers were extinguished, have only themselves to blame if they now find themselves in a muddle. Of course, a number have, through the easier conditions in regard to costs, ceased to shelter themselves under the Act by the ability to reduce the price of gas to the consumers. For the rest, there has been ample opportunity to avail themselves of section 1 of the Gas Regulation Act. If there are any maximum price undertakings that, on Aug. 31, were charging above their old maximum prices, through the permissive powers temporarily granted by the 1918 Act, then on Sept. 1 they were doing something illegal if they did not drop the charges to the maximum ones that ruled before 1918. Anyway, in cases where the charges were above the old maxima, and had to fall to their levels, a special reading of meters would have been required. But we have latterly seen that there has been a large number of applications for Orders, and a good output, which must have required severe application on the part of the Director of Gas Administration and his staff, in view of the individual consideration that has to be given to working data in order to determine the new standard and maximum prices. Among the applicants for and the recipients of Orders, there has been a good representation of local authority concerns, and several have made their declarations of calorific power to apply as from Sept. 1, and have introduced the thermal basis of charging as from that date. In those instances, to save a special meter reading, no doubt they have taken the advice of the National Gas Council, and have, for present convenience, made the therm charges as closely equivalent to (but not in excess of) the prices charged per 1000 c.ft. in the preceding two months of the quarter.

Incidentally, we are glad to see that the local authorities are now moving with greater strength into line with the statutory gas companies, by coming under the therm powers of charge. The intention of the Act was co-ordination; and this, combined with the Departmental Committee's recommendation as to the general application of the system throughout the areas of the statutory gas supply undertakings of Great Britain, leaves as a very secondary consideration any discretionary power that the Gas Regulation Act confers on the Board of Trade. There is confidence that the latter intend to bring about the contemplated co-ordination in respect of the thermal system and testing conditions; and therefore, in our opinion, nothing is (we could never see that anything was) to be gained by continuing to stand aloof. The time will come when every statutory concern will be operating under section 1 of the Act, and selling gas at per 100,000 B.Th.U. The sooner this condition is arrived at, the sooner consumers everywhere will be able to contrast with others the price they are paying for a definite qualitative value, and the sooner we shall have a common basis for technical and trading computations and comparisons.

Changes which Affect Interests.

THERE have been during recent years large developments in connection with governmental matters, which have introduced new authorities with special interests entrusted to them. Naturally, with *ad hoc* bodies of the kind, concentration grows and activities increase in the direction in which they function. This change is one which cannot be overlooked by all industries, for there is such interrelation now between them and all parts of the national organism that a more exacting watch has to be maintained over the work of these new bodies in order to see that interests and essential agencies are not affected, and, when there is any sign of menace, to do all possible to secure protection or alleviation. No particular section of the community or of the industrial world can stop progress in another because its own interests are affected; but what can be done is to try to ensure that interests are not unnecessarily affected, or that there is such systematization that the maximum total benefit is ensured to all concerned, rather than a maximum benefit for one particular part to the detriment of the others. It is only to be expected that, when a body is appointed to look after the legislative and administrative interests of one section of our national system, those interests will have predominant consideration by that body. Hence the necessity for all sections to have a central authority watching over their interests, and endeavouring to exercise a moderating and yet generally helpful influence.

The recipients of the monthly reports of the National Gas Council will appreciate this by the variety of examples that come before them. Take a single month's report. Without touching upon the portions that deal immediately with the affairs of the gas industry, there is the statement which shows the part the National Gas Council took in proving, in conjunction with the Electricity Supply Companies of London, that the Electricity Commissioners were acting *ultra vires* the provisions of the Electricity Supply Act of 1919 in respect to the plans they devised for dealing with the electricity supply problem in London. The Commissioners, it will be remembered, instead of creating (as authorized by the Act) one Joint Authority for London and the Home Counties, were proposing to appoint a Local Authority Committee and a Company Committee, and to delegate respectively to them wide powers which should have been vested solely in the Joint Authority. This may appear to be a matter of purely local interest. But precedent in legislative matters shows that developments which originate in London often spread to other parts of the country. The National Gas Council had to consider this division and delegation of powers from the point of view of gas undertakings who are large ratepayers. What may have happened, had the Commissioners' scheme matured, is of course highly problematical; but the risks were considerable. As already announced in our columns, the view of the National Gas Council was upheld by the decision of the Court of Appeal in the case in which the London Electricity Supply Companies charged the Commissioners with acting *ultra vires*.

The part that the Council have taken in the reduction of railway rates on coal and coke and other necessaries of gas-works is a further illustration that has perhaps more general interest. The same with regard to smoke abatement. In this latter respect, the Council are acting in concert with the Federation of British Industries to secure a Smoke Abatement Bill which will have beneficial effects without being unduly stringent in any quarter. The new Bill, which it was hoped would disclose more initiative and originality, does incorporate certain improvements (which, however, do not go far enough) through the energy displayed by the Federation of British Industries. Compared with the former Bill, the newcomer contains a modification in favour of industries. It provides that, "in any proceed-"ings for sending forth smoke from a chimney in such "quantity as to be a nuisance, it shall be a defence for the "person charged to show that he has used the best prac-"ticable means for preventing the nuisance, having regard "to the cost, and to local conditions and circumstances." Some gas undertakings may regard this as an important matter, in respect of their own conditions. But in our view there is not the slightest reason why in this respect gas undertakings should not work their processes efficiently, and be a pattern to others—particularly when they advocate the use of coke and gaseous heating for industrial processes, and which (for respective purposes) are practicable means for preventing smoke and securing high efficiencies. Regarding domestic smoke, here again the National Gas Council have, it is obvious, been exercising their influence through the Federation of British Industries. Though the Bill does not expressly deal with this important contributory source of nuisance, we are assured that the Government appreciate the importance of dealing with the problem, and would welcome the inclusion of provisions if it could be shown that they would be reasonably practicable and of real utility. The Bill does provide for increased bye-law powers to local authorities in respect of new buildings; but something more definite is required. Suggestions have been made for improving the Bill in this regard; and, in view of the fact that the matter will be fully discussed at the next meeting of the Central Executive Board, the National Gas Council, it is understood, would welcome from members any communication (addressed to the Secretary) containing suggestions on the subject. This is a matter in which the industry has a peculiar interest, as sellers of gas and coke, the former of which holds a position as the cheapest labour-saving smokeless fuel on the market.

Numerous other matters are mentioned in the report, which confirm the need for the existence of a central body such as the National Gas Council in view of the developments in the methods of government, regulation, and control. Another such development is the Ministry of Transport. The work of that Department has in various ways a close association with the interests of the gas industry —the large movement of material that proceeds in connection with it, the considerable use made of one of its products in the construction and upkeep of roads, and the fact that the distribution systems of gas undertakings are under the highways and urban roadways of the country. Among its numerous activities, the Ministry have in contemplation the promotion of a Bill in Parliament to obtain new powers to organize the traffic of London. One of the objects of the Bill would be the appointment of a Statutory Advisory Committee to deal with all traffic questions in the Metropolis and within a radius of 25 miles from Charing Cross. The recently much-discussed topic of the breaking-up of streets is a matter that would come before this Committee. In this relation, the desirability of further co-operation between local authorities and those undertakings having powers to open roadways has been prominently before the gas industry lately, owing to the views expressed at the Board of Trade conference respecting injuries to distribution systems which promote escapes. The National Gas Council sought (but it does not seem probable that it will receive) direct representation upon the proposed Statutory Advisory Committee. It appears, however, that the plans will include a Technical Sub Committee, whose duties will be to advise the Statutory Committee on such matters as the relative merits of different methods of carrying out work. This is a direction in which special technical influence could effectively be brought to bear. Upon the Sub-Committee the Council may possibly have representation, if statutory powers are granted to the Ministry.

These are merely examples of the great diversity of questions and movements over which watchfulness is called for and action taken. It has always to be remembered that gradual changes and developments are constantly taking place in every part of our national system; and it is the duty of every contributory part of that system to shape its own internal course to those changes and developments, and to maintain the interests of, and effect the utmost efficiency for, itself in respect of them. To accomplish this, it must have effective machinery. Such machinery, there is no question, the gas industry possesses.

The Heating Season.

THE heating season is fast approaching—in fact, we have already been experiencing early autumnal temperatures, which make a little fire, morning and evening, welcome. Progressive gas undertakings are advertising the fact among their consumers that, in order to save the inconvenience of waiting when new gas-fires are wanted for use, they are prepared to fix them now, and not expect any payment for the work until the December account is paid. Our electrical friends up to the present have not shown any particular eagerness or enthusiasm respecting the coming heating season. An American scientist, Dr. Steinmetz, recently predicted that electricity is going to bring about an "amazing transformation of human life;" that through electricity "another century will solve all the problems

that now vex the inhabitants of the earth;" and in that day "the skies will be clear of smoke and the streets free from refuse." There are many British electrical men who are of opinion that among the "amazing transformations" that will be brought about by electricity, domestic heating will not rank. The load is too haphazard for their liking; and, when it comes, it is far too concentrated for electrical conditions. Moreover, all the provision that would have to be made for it would be largely idle and unproductive during the greater part of the year. That is not the sort of business which they desire. They prefer electric cooking and the heating of water for domestic purposes—demands which continue through the whole course of the year. But they have by no means negligible difficulties in developing these branches of business; and the work is wearying. The eulogizing of their methods in the ears of the public (they are now even having recourse to the broadcasting of lecturettes on cooking) has to be loud and long; while the effects are by no means commensurate with the efforts.

However, as to electric fires, we are told that their prices at present are as low as are consistent with the demand. Manufacturers indicate that the electricity supply undertakings are not at all enthusiastic about laying in stocks of electric fires for the coming winter. Encouragement by the public is not sufficient; and apparently the manufacturers think the same. Therefore, their intention is to maintain during the coming season the prices ruling in the 1922-23 one. Some reductions have been made in the higher priced, and less saleable, articles; but that is about all. There is a suggestion, too, that larger electric fires should be produced for the monied part of the aristocracy. Such demand would hardly pay the manufacturers for the designing and pattern-making. For the general economy of the country, it is no doubt a good thing that there are these obstacles to the development of electric heating, in view of the low efficiency of the process of transforming the heat energy of solid fuel into electrical energy. However, the difficulties of electricity in these respects should not cause gas undertakings anywhere to relax their efforts to increase the gas-heating load. Heating is essentially a business for the gas industry. Every argument is on its side where a labour-saving, smokeless heating agent is required.

The time is particularly opportune for putting new energy into this business. People have had several years' experience of high prices for gas. Never has there been a year within our recollection or range of reading in which such sweeping reductions in the charges for gas have been effected; and these reductions must be appreciated by the public, and will be an incentive to a more liberal use of gas. Then again, labour-saving in the household has become a common topic. It is written and talked about more frequently than ever before; and manufacturers of all sorts of domestic appliances now advertise their labour-saving virtues. Gas for heating, cooking, and hot-water supply is a labour and dirt saver of superlative merit. Furthermore, there is the Smoke Abatement Bill in Parliament. The public during the past few months have heard a great deal through the public Press of all we lose in health and wealth through the emission of smoke from our domestic and factory chimneys. Assisted housing schemes are again also to the fore. In short, everything points to the present opportunity to press forward to secure the maximum number of gas-fire connections. Every gas-fire that is well maintained and rendering good service is an advertisement, and frequently an agent in securing further business for the future. Upon the future every progressive gas administration keeps an eye.

Coal Output.

According to a statistical summary issued last week, in the first quarter of this year the amount of saleable coal raised in Great Britain was 67,077,543 tons, and the quantity disposable commercially was 61,335,892 tons, of which 23,262,722 tons were shipped. The costs of production were £50,663,203, of which wages accounted for £35,441,768. The proceeds of commercial disposals totalled to £58,156,716, showing a credit balance of £7,493,513, or equal to 2s. 5·32d. per ton. The number of workpeople employed was 1,087,733; the average output per man-shift worked was 18·25 cwt.; and the average earnings per man-shift worked was 9s. 7·72d.

National Gas Exhibition.

Bingley Hall, Birmingham, is the scene of much activity at the present time. A large gang of workmen of all categories is engaged on the preparatory work for the National Gas Exhibition. Mr. R. J. Rogers, the Hon. Secretary, appears sanguine that everything will be ready by the opening day—Sept. 17.

The Opening.

The Exhibition will be formally opened by the Lord Mayor of Birmingham (Alderman Sir David Davis, J.P.) at 3 p.m. on the 17th inst., when he will be supported by Mr. D. Milne Watson, D.L., President of the National Gas Council, and by Sir Arthur Duckham, K.C.B., representing the Society of British Gas Industries. It is anticipated that a fully representative gathering of persons prominently connected with the industry will be present at the opening ceremony.

The Exhibition and Railway Fares.

The educational value of the exhibition for gas employees of all grades will be great; and all gas undertakings who can possibly do so should organize parties of employees to make the trip to Birmingham. For parties of twelve and over, the Railway Companies will issue return tickets to Birmingham at fare-and-one-third, *on notice being given to the local station a few days before the date of the visit.*

When Experts Differ!

Notwithstanding the article by Dr. H. G. Colman in our issue for June 27, and the statement made by Mr. B. R. Parkinson at the meeting of the Institution as to the views that he and Mr. J. G. Taplay hold, Mr. Herbert E. Williams, of Manchester, is not prepared to budge from the position he took up in his article in our columns on June 20, that hydrocyanic acid is not a primary agent in causing corrosion. In a further article in our columns to-day, he emphasizes his view that, if hydrocyanic acid were completely removed from gas, corrosion would still take place in exactly the same manner, and to precisely the same extent, due to the action of carbon dioxide, oxygen, and moisture. While hydrocyanic acid causes no direct corrosion, he holds that, in combining with the products of the carbon dioxide corrosion, it could theoretically return its equivalent weight of carbon dioxide into the gas stream. Dr. Colman, on the other hand, is strongly of the opinion that it is largely due to the presence of hydrocyanic acid that corrosion is started, which then is carried on by the normal rusting action of moist carbon dioxide and oxygen.

Qualified Directors.

Last week we were writing on the subject of the composition of boards of directors, insisting that some of the causes that led to the election of men to-day should in future be abandoned in favour of selecting those who are specially qualified to direct. In the case of undertakings carrying on special work—such as gas manufacture and supply—very particular attention should be given to the question of a suitable combination of qualification. Immediately this article was published, we were interested by the reason given by Professor Arthur Green, F.R.S., for resigning from the post of Research and Chief Chemist of British Dyestuffs Corporation, Ltd., for which position he left the Chair of Applied Chemistry (Dyestuffs) at Leeds University. His reason for taking this step is that "there is an insufficient number of scientific and technical members of this important national concern." He ought to know, having been associated with it since the year 1916.

Coal Merchants and the Public.

The reduction by the coal merchants of the prices of household coal for summer delivery has not had the desired effect; and now a hint has been given that prices may rise again shortly without any warning. It was stated on the Coal Exchange last week that there may be a change in price at any time; and therefore it is dangerous to wait until the end of August before sending in orders. The coal merchants sigh for the return of those years when householders stocked automatically in the summer. Nowadays, it is said, "there is a tendency to hang back until the last moment. The average coal merchant is losing money all through the summer months; and he is bound to recoup himself during

the winter." The availability of gas as a fuel is one cause of the householders' independence of the coal merchant and a stocked coal-cellar.

The Mining Agreement.

The demands that were recently put forward by the Miners' Federation for an alteration of the ratio of profits to wages in the mining industry, it will be remembered, were referred by the Mining Association to the District Coal Owners' Associations for consideration. Now it appears that in certain districts of the country the coal owners are themselves not wholly satisfied with the results of the working of the agreement; and when the two great national bodies meet in a few weeks' time, it is probable that not only will the requests made by the Miners' Federation be brought forward for consideration, but demands formulated by the owners' representatives. A statement has been published that the return on the capital invested in the industry of late has been nothing like sufficient to provide for the maintenance and continued development of the latter, particularly when the higher scale of taxation is taken into account. As to this year, prices of coal have fallen considerably since the early part; and therefore, owing to the difference there is between the period on which wages ascertainments are made and the period to which the wages apply, the larger apparent profits will only have temporary existence. The owners also point out that the best hope of an increased rate of wages in the lower-paid districts lies in the reduction of working costs. The main factor in the determination of working costs is the output per person per shift; and statistics clearly show that, generally speaking, the output per person per shift in districts on the minimum wage is far below that in districts in which a rate of wages above the minimum prevails.

Trade Union Differences.

The differences between trade unions continue. The repudiation by the Boilermakers' Union of the agreement entered into with the employers, on March 22, by the Federation of Engineering and Shipbuilding Trades, which was accepted by all the other constitutent bodies, is bringing disaster upon the ship building and repairing industries, and upon the army of men engaged in them. The lock-out of the boilermakers has been in progress now over twenty-three weeks; and it is calculated that one idle boiler maker involves fifteen or sixteen other men. Pressure has been exerted by the other unions to get the boilermakers to honour the agreement; but, with crass stupidity, they (or the leaders of the Union) remain obdurate. There has been a conference between the various constituent unions; and the Boilermakers' Union have no doubts now as to the firmness of the view of the other unions that the recalcitrant one should observe the agreement. But there are no signs of any immediate surrender, despite the black outlook for all who cannot work through this act of disloyalty. The dockers' strike was another instance of the repudiation of an agreement entered into on their behalf by their Union, and endorsed and observed by the men, until a reduction of wages was due under it to which they refused to be parties; but they had to give way after receiving a severe self-inflicted lesson. In another direction there has been an attempt to bring about an agreement between the National Union of Railwaymen and the craft unions in regard to the application of Award No. 728 of the Industrial Court to railway shopmen on the Great Northern section of the London and North-Eastern Railway. So far there has been failure. The National Union of Railwaymen want the award applied; the craft unions do not. The Ministry of Labour are making a further effort to adjust the differences; but the craft unions say their attitude is "definite and unalterable."

A Tar-Distilling Amalgamation.—Messrs. Robinson Brothers, Ltd., inform us that they have, after a period of close association with Messrs. Lewis Demuth & Co., Ltd., effected an amalgamation of their respective tar-distilling interests in the Midlands, under the name of "The Midland Tar Distillers, Ltd." All the Directors of Robinson Brothers, Ltd., join the Board of the Midland Tar Distillers, Ltd., and the business of what will henceforth be known as the Robinson Brothers Branch will be carried on as hitherto. The above arrangement does not affect the tar-distilling interests in Yorkshire.

PERSONAL.

A pleasing ceremony took place in the Boardroom of the Imperial Continental Gas Association on Friday last, when a presentation was made by the London staff to Mr. W. P. HINMAN on his retirement after thirty-seven years' service with the Association, during twenty-eight of which he filled the post of Registrar. Mr. W. A. Phillips, who has been appointed by the Board as his successor, referred in moving terms to his long association with Mr. Hinman, extending over thirty-two years, and stated that the gift represented contributions from every member of the staff. The Secretary (Mr. F. H. James), in making the presentation, which consisted of a gold watch for Mr. Hinman and a brooch for Mrs. Hinman, spoke of the esteem in which Mr. Hinman was held by all his colleagues, and expressed the hope that he might live for many years to enjoy his well-earned rest. Mr. Hinman, in thanking his colleagues, referred to the sadness which he felt at the severance of such a long friendship and association, and said what a pleasure it had been to be a member of such a happy family as the staff of the Association represented.

Last Thursday a presentation was made to Mr. R. W. C. BEYNON (Engineer and Manager of the Torquay Gas Company) on the occasion of his retirement after forty years' service. The gift consisted of a pair of binoculars suitably inscribed; and an electro-plated tea pot, sugar basin, and cream jug were presented to Mrs. Beynon. The meeting was presided over by Mr. W. Robins, who has been with the Company for forty-seven years. He referred to the esteem and respect in which Mr. Beynon had always been held, and expressed pleasure that Mr. Beynon had been elected a Director, and would therefore not sever his connection with the Company. Mr. T. Grute, the oldest employee of the Company, made the presentation, and in a few well-chosen words spoke of the kindness always extended by Mr. Beynon.

Messrs. Thomas Glover & Co., Ltd., of Edmonton, N. 18, announce that they have appointed Mr. A. G. WILSON, late Northern Manager of The Bland Light Syndicate, Ltd., as their North-Eastern representative, with headquarters at Newcastle-upon-Tyne.

At Holy Trinity Church, Darwen, a week last Tuesday, Miss Dorothy Scholes, daughter of Mr. Scholes, of Bank Terrace, was married to Mr. NORMAN SMITH, the Assistant Gas Engineer. The honeymoon is being spent at Bournemouth.

ELECTRICITY SUPPLY MEMORANDA.

THE electricity undertakings of the country ought surely to know by this time what their critics inside the industry think of them in respect of their trading methods with the public. They are constantly being admonished in various ways. Their responsible men are accused of not having the commercial instinct, and of not knowing how to deal with the public, upon whom there is fundamental dependence. Yet with all the criticism and admonition, the evidence of papers before the electrical associations, of paragraphs in the industry's journals, of the existence of the Electrical Development Association, of salesmen's conferences, and so forth, is that many electrical undertakings are keenly alive to the importance of the subject. The contributions of the electrical manufacturers and contractors are insignificant in comparison. In the "Commercial Development Section of the Electrical Times," an article recently appeared under the title of "An Industry that Neglects its Retail Market." Though we have read that article, we must adhere to our previously expressed opinion that there is not the neglect to the extent represented, but that the electricity supply industry for domestic electrification has not the goods and commodity that in respect of heating operations sufficiently appeal to the public from the points of view of economy and efficiency. Otherwise, the public would not have been blind to them, any more than they are to other useful innovations. The fact is that the responsible men of the industry are, or affect to be, blind to the shortcomings of their own instruments, shortcomings which are so patent to other people. That by the way. If the industry likes to pretend that the slow progress of domestic electrification is due to its own business deficiencies, it is welcome to the reproach which accompanies the self-condemnation.

Self-Condemnation.

Cultivation of the Retail Trade.

The article in our contemporary points to the peculiarity that differentiates the gas and electricity industries from all other forms of trading. This arises from the fact that the undertakings supplying gas or electricity have definite areas allocated to them in which to operate. The appliances which consume their respective primary commodities are fixed in their supply areas. They are altogether different from (say) motor cars, which move wherever their owners please, unconfined to any area within which to purchase the fuel they require. The writer of the article sets out to examine the question as to whose business it is to cultivate the retail trade in electrical appliances; but, in the result, there is not much enlightenment. He seems disinclined to say anything very definite

on the subject. Without much hesitation, we should have said that the business was really that of the suppliers of electricity, in view of the defined position that they occupy in respect of the sale of the commodity which is necessary to the use of the appliances, and the fact that the efficiency of use of the commodity depends upon the appliances, as therefore does the satisfaction of the users and the stability of the trading. The writer of the article puts the position in a nutshell when he says: "The two services—(1) of goods and their maintenance, and (2) of electric supply and its maintenance—are mutually complementary, and react directly on one another." This brief statement of the case unerringly points to the electricity suppliers being the retailers of the appliances. But the electricity industry is subject to two conditions from which now it cannot detach itself. The one is that for long its administrators did neglect the retail business, and so allowed the outside contracting section to grow in strength; and the other is that the dominant part of the industry is constituted of municipal undertakings. When the latter woke to the facts of the position, and desired to trade in appliances, they found a strong retail element opposed to any such proceeding. Now, at this late period, we have the writer in our contemporary asking who is the right person to handle the job if a consumer requires a cooker or a washer on a hire and maintenance basis? He avoids a direct answer. Tradesmen detest municipal trading when it affects their own businesses. But many of them advocate it when it affects others.

Who Should Canvass?

The writer in our contemporary finds the question becomes still more complicated when the canvassing of indifferent citizens comes to be considered. "Is the supply authority to canvass? Few people will answer in the negative. Is the contractor to canvass? He will not be worth his salt if he doesn't." The desire to be neutral is perfectly obvious. It is a case of trying to please two sides at the same time, with the result that the argument becomes almost painfully ineffective. But he can discover no code to regulate the respective activities of the two sections. If he cannot find a code, cannot he find a guiding condition? We will give him one. The gas or electricity suppliers have permanent business relations with householders. Their supply and their meter—perhaps other things—are in the houses. They have a right of entry to examine the meter registers. Their relations are altogether of a closer nature with the householder than the electrical contractor's can ever be. There is no similarity in their respective positions. Those with the closest relations, those who have the superior standing of the public utility undertaking as compared with the tradesman, are the ones who should canvass. They have the greater authority at their backs. But to suggest that both they and the contractors should canvass is to suggest something that would soon cause the electrical people to be regarded as a public nuisance. The plates that used to be placed on entrance gates "No hawkers," would be succeeded by "No electrical canvassers." However good business methods are up to a point, they must not be carried so far that they become a nuisance and cause resentment. However, the fact that there is no code regulating the respective activities of the electricity suppliers and the electrical contractors is regarded as one of many shortcomings in the industry. It is pointed out that, although it seems to affect immediately only the supply authorities, it has the most serious reaction upon the manufacturers. No doubt it has—if all is as represented; for there is not one section of the gas or electricity supply industries that can well live without the others. Perhaps that is going too far. Electrical appliance manufacturers and the electricity suppliers could live well enough if the whole of the wiring work and the placing of appliances were left to the latter, and the contracting element became extinct. Admitting that a certain amount of canvassing is being done among the public, the writer unkindly describes it as a "mere scratching of the ground here and there." The virtues of electricity are apparently considered paramount in all directions in which it aspires to business; but the electricity advocates themselves by their everlasting cry for more propaganda and more energy show that those virtues are of themselves insufficient for business development. Summing-up, the writer of the article finds that the industry is over-canvassed by the manufacturers within; while outside the public are under-canvassed. Yet it is upon the public that manufacturers of appliances and electrical suppliers depend. He urges some systematic method of going into the highways and byways, to "compel" the public to come in. There should be no need for compulsion, in view of the ascribed virtues of the primary commodity.

Broadcasting.

Among the new ideas for advertising electricity is "broadcasting." We have seen notices of two or three instances of it lately. They are in the form of lecturettes on the applications of electricity. People who are "listening-in" for the purpose of entertainment do not want to hear advertisement lectures. These will probably do much harm to the popularity of broadcasting. However, from the British Broadcasting Company's station, Manchester, Mr. C. H. Rayner, the Acting Sales Manager of the Corporation Electricity Department, recently "broadcasted" a lecturette on cooking by electricity. The first thing that Mr. Rayner urged was that people should get away from the idea that cooking by electricity is expensive. This all depends on what people include in the term "cooking." Electricians say very little about the work of the hotplate; but the people to whom they are appealing include all the operations which they have been accustomed to carry out on the gas-cooker. We have known people who use the hotplate of the gas-cooker not merely for all boiling operations for meals and washing-up, but for all household purposes as well. It would never do for them, if money and time are considerations, to use the electric cooker in the same way. The great care that has to be taken with the latter, owing to the low efficiency of the hotplate and the dearness of electrical B.Th U., is evidenced by one of the remarks of the lecturer: "In cooking vegetables, only a small quantity of water is required in the pan, the food being practically steam cooked, which is the ideal method for retaining the valuable vegetable salts." A further observation was that "in conjunction with the cooker, a 3-pint self-contained electric kettle for boiling water for tea making, &c., and providing hot water for culinary purposes" is advisable. Mr. Rayner did not say why it was advisable. Perhaps it would have been impolitic to mention that the self-contained kettle has a higher efficiency than the heating elements on the hotplate, and that great care has to be taken to use with them suitable utensils with perfectly plane bottoms owing to low efficiency, which, low as it is, wanes with the use of the elements. He also seemed to favour the Norwich tariff. In Manchester it has been adopted on the lines of a fixed charge of 30 p.ct. on the 1914 rateable value of a house, and a running charge of ½d. per unit used for all purposes. A number of people with whom we have talked on this subject do not like the lump fixed charge, *plus* an additional payment. They naturally say: "If, by so paying, the current consumed works out at the end of the year (for example) to 2d. or 2½d. per unit, why cannot the department supply us at a flat rate of 2d. or 2½d. per unit all round?" We cannot expect the man in the street to understand the intricacies of the electrical reasons for charging the fixed sum. Mr. Rayner did not bother him regarding that; but he said to him: "Learn to look upon the fixed charge as part of your general rates for public services, to be grouped with your poor rate, education rate, water rate, and so on." This was surely an unfortunate suggestion; for, if there is one thing more than another that is obnoxious to the majority of householders, it is the mention of rates and taxes. To ask the householder to regard the payment for electricity as an addition to the rates, is suggesting the extension of something that is already highly repugnant to him. It is not an idea that will tend to popularize electricity. We know all the difficulties of getting electricity adopted for heating and cooking purposes; but we are afraid this proposition will not help development to any extent. Nor will this: "During the recently extremely hot weather, the housewife with an electric cooker has been envied by her neighbours, who are not so fortunate." Hearing this, the ordinary householder will say: "Just what I have previously heard; there is no heat in electricity." Others will say: "If there is no heat, then how is the food cooked?" In their extremity for cultivating the cooking load, the electricity people are running themselves into absurdities which will not appeal to the people. Anyway, the last argument had better not be used during the next eight or nine months, or householders may reply that the warmth of the gas-cooker, the rapidity with which it can respond to requirements, and the relative cheapness are very desirable.

Low Rentals.

Of course, electricity undertakings would like to develop a domestic cooking load, because it is an all-the-year-round one; and there is a good diversity of demand in connection with it. One of the troublesome things about it is that the initial cost of electric cookers is high compared with gas-cookers, and so are their installation and maintenance costs. In the circumstances, only rich undertakings can afford to let out such appliances at low rentals. The Propaganda Sub-Committee of the Electricity Committee of the Glasgow Corporation are proposing to tempt more householders to use cookers by offering them at rentals of £1 for the first year and 10s. per annum thereafter. Such rates cannot, for a good class electric cooker of decent capacity and appearance, pay capital, sinking fund, and maintenance charges. Electric radiators and heaters it is also proposed to offer for hire at rents ranging from 9s. to 15s. per annum.

French Wiring Methods.

"Megohm" in the "Electrical Times" has been doing something which will not advance the *entente*. We have no reason for doubting that his strictures regarding French wiring methods are completely justified; but he has made them in an unambiguous and merciless fashion. He declares that the great bulk of the existing wiring would at sight be condemned by a British fire office inspector as a serious fire risk, and by any British architect or builder, or even householder, as a hideous disfigurement. He does not like the Continental surface systems, though many of the advocates of cheaper wiring in this country hold them up as examples to be followed. They will not get a customer in the expert critic "Megohm." To see pendant lampholders hung by white twin-twisted flex, without any effective cord grip in some cases, and to have the flex run across ceilings and down to the switches, are offences to sound electrical proprieties. "Megohm" condemns in much detail the slovenly work that he has found. In an artistic country such as France, he is shocked over the hideous selection of electric light fittings and shades, the untidy method of using them, and (in the

district at any rate that he has been visiting) the inappreciation of the most elementary principles of illuminating engineering. In the very room in which he was writing, there were six 100-watt gasfilled lamps, with plain bulbs and filaments only 7 ft. from the ground. Our friend need not have gone to France to see something similar. On the first floor of a large hotel at an English seaside resort, the writer has been occupying a room in which there was a flexible wire running right across the ceiling to an electric lamp over the bed; and both that lamp and the one above the dressing-table were fully exposed, both only having a small opal saucer-shaped shade over the top, in which seemed to be reflected countless filaments—this without having touched the cup that cheers and (if taken in sufficient quantity) inebriates. Illuminating engineering, forsooth! The very elements of it are not understood—if performance may be taken as the expression of understanding—by a large number of men who claim to be experts. However, our friend thinks there is a rich harvest in France for British makers of electric heaters, cookers, and geysers—if they will only take the trouble to go there and reap it. So far as his investigations went in the district which he has been visiting, he says gas is not used, and coal and coke are dear. Our gas friends in France will probably note these remarks, and, if they really apply to them, will bestir themselves. Towards the end of his notes on this subject, "Megohm" says that two or three electric geysers in a French hotel of moderate size would pay their cost in a month. We cordially agree—if they were used; and, if used at the time of installation, how long, after experience, would their service be continued?

A Spark and a Destructive Fire.

Electrical operation is sometimes adopted in dangerous situations on the ground of safety. But electric motors are not unknown to spark, and electric wires to fuse. These are not conditions that give one confidence where there may be highly explosive gases or vapours escaping, or readily combustible substances about. An illustration is given by a report in the "Iron and Coal Trades Review" of a serious fire at the works of the Shelton Iron, Steel, and Coal Company, Ltd., on Aug. 19. It states that the outbreak originated through a spark produced by the "fusing of an electric motor," which stood several feet above the ground between the naphthalene tanks and the benzole store. A number of bags containing naphthalene first caught fire; and the flames spread with alarming rapidity in the direction of the benzole tanks, which contained a large stock. All the available workpeople were hurried to the spot, and efforts were first directed towards preventing the flames from reaching and exploding the benzole tanks. At this point the flames were fortunately checked; but the nearest of four naphthalene tanks was soon involved, and quickly became a mass of flame. Volunteers set to work shovelling sand and loose ballast into the blazing tank, and the Hanley Fire Brigade, which had arrived on the scene, pumped water from the canal near by into the heart of the fire. Three other naphthalene tanks were in danger of being involved; and it was not until nearly midnight that all danger was over, and the fire under control. The damage done is of considerable extent. One naphthalene tank was reduced to a mass of ruins, and over 1000 gallons of naphthalene destroyed. The three other tanks and the benzole store were fortunately saved. The prompt measures taken when the outbreak was discovered undoubtedly prevented an explosion. And this was the work of an electrical fusion!

Association of Gas Salesmen (Northern Area).—We learn from Mr. O. Nicol, the Hon. Secretary, that in view of the National Gas Exhibition at Birmingham, and the proposed Salesmen's Conference there on Sept. 22, as well as the desirability of all interested in the sale of gas attending the Exhibition, it has been decided to postpone until December the next meeting of the Association, which had been arranged for Sept. 5 at Scarborough.

The Lighting of Schools.—An article by Mr. Leon Gaster, F.J.I. (Editor of "The Illuminating Engineer") on the lighting of schools, forms the subject of publication No. 114, Vol. XI., of "A Thousand-and-One Uses for Gas," issued by the British Commercial Gas Association. This highly important matter is admirably dealt with; many excellent photographs illustrating the splendid results obtained by the use of gas. The influence of schoolroom lighting is profound; and it is good to read that the London County Council have already converted over a hundred of the gas-lighting installations in their schools on lines indicated in the illustrations which appear in this publication.

Cast-Iron Pipe Specifications.—The American Gas Association have submitted for the approval of the American Engineering Standards Commission three specifications for cast-iron pipe and special castings. These specifications were developed by the American Gas Institute in 1911, at which time the dimensions for ball and spigot castings were adopted. In 1913, the Association adopted the dimensions for flanged castings and specifications governing the manufacture of all cast-iron pipes and specials which were derived from an old standard adopted in 1905 by the American Gas Light Association. These, again, were based on seven years' experience with the standards designed by the Society of Gas Lighting in 1890. The Standards Commission have appointed a representative Committee to consider the application for the approval of these specifications, which are said to be in general use for underground gas-pipes throughout the States.

CORROSION OF GAS MAINS AND METERS.

By HERBERT E. WILLIAMS.

In formally moving the adoption of the Ninth Report of the Life of Gas-Meters Joint Committee, Mr. Parkinson stated (*vide* "JOURNAL," Vol. 163, p. 191) that "all are agreed that primary corrosion is caused by oxygen, carbon dioxide, and moisture." It is of interest to note that corrosion of gas-mains is now admitted to be caused by these common corrosive agents, and that the hydrocyanic acid was dragged in to make the Report more sensational. There is, however, one point that does not yet seem clear—that these common corrosive agents for iron (carbon dioxide, oxygen, and water) act on the iron without the intervention of hydrocyanic acid.

The statement that "oxygen and carbon dioxide play an essential part in the process of corrosion by hydrocyanic acid" (*vide* "Summary of Sixth Report," "JOURNAL," Vol. 163, p. 190) is more misleading; it is like looking at the question through the wrong end of the telescope. The true facts are:

1. That carbon dioxide, oxygen, and water play the essential part in the process of corrosion, uninfluenced by the hydrocyanic acid.
2. That the hydrocyanic acid causes no direct corrosion, but that, in combining with the products of the carbon-dioxide corrosion, it could theoretically return its equivalent weight of carbon dioxide into the gas stream.

The proportion of hydrocyanic acid in the gas is 3 to 4 grains, and of carbon dioxide 900 to 1000 grains per 100 c.ft. If, then, we allow the full effect of the hydrcyanic acid, $\frac{1}{300}$th to $\frac{1}{400}$th part of the carbon dioxide will be returned to the gas stream. As the gas already contains more carbon dioxide than could possibly be absorbed in the surface moisture in the mains, it is obvious that this minor reaction, described in the Report as "very destructive," can have no influence on the corrosion. Its consideration, therefore, as a corrosive agent is manifestly absurd. But when this reaction, which gives no corrosive effects, is stated as the main cause of the corrosion, and described as the "predominant agent," and given "first place in degree of intensity," while the true corrosive agents have a subsidiary position, it is time that "chemists should come rushing along," to adjust the sense of proportion that has so seriously gone astray.

There also appears to be a little confusion among the members of the Life of Gas-Meters Joint Committee on the course of reactions of hydrocyanic acid. Mr. Parkinson, at the meeting of the Committee, stated (as reported in the "JOURNAL," Vol. 163, p. 191) that Mr. Taplay agrees that the hydrocyanic acid combines with the corrosive deposit, but adds "that in doing so it liberates carbon dioxide for further mischief;" whereas Mr. Taplay in his letter to the "JOURNAL" (Vol. 162, p. 487), in reply to Mr. Richardson's paper, states: "The ferrous cyanide thus formed is liable to be decomposed by the carbon dioxide in the gas, producing hydrated ferrous carbonate." These statements are contradictory; and as chemical reagents do not possess that human power of free will, they cannot both be right. As a matter of fact, the former only is correct.

It has been stated by Dr. Colman (*vide* "JOURNAL," Vol. 162, p. 794) that the hydrocyanic acid and ammonium cyanide attack the protective oxide coating on the internal surface of the mains. This coating consists of anhydrous ferrosoferric oxide produced during the heat treatment the main receives in its manufacture. The protective action of this scale is, however, very short-lived—as all who have vainly trusted to its efficiency are aware—and retards the action of corrosive agents only for a short time. This fact is, of course, well known to the gas engineer, who has to protect the iron surfaces of his plant by painting, to prevent rusting by the action of the air which contains only about one-hundredth part of the carbon dioxide of coal gas. The only possible action the hydrocyanic acid or ammonium cyanide could have on this scale would be to combine with the ferrous-oxide portion of the ferrosoferric oxide to form ferrocyanide. The writer has frequently endeavoured to use the more reactive hydrated ferrosoferric oxide to convert an alkaline cyanide into ferrocyanide, with very incomplete success.

The question of corrosion of mains is an important one in the gas world; and it is necessary that the hydrocyanic acid bogey be laid once for all. The gas manager, on reading the Report of the Life of Gas-Meters Committee, might very reasonably be led to put down expensive cyanogen scrubbing plant to arrest his corrosion, only to find—as he assuredly would—that the corrosion of his services and mains was as serious as ever, and that he should have confined his attention to the carbon-dioxide and moisture contents of the gas.

In conclusion, according to experimental evidence and to the known reactions of the constituents of the gas, if the hydrocyanic acid were completely removed, the corrosion would take place in exactly the same manner and to precisely the same extent, due to the action of the carbon dioxide, oxygen, and moisture.

London and Southern District Junior Gas Association.—A special general meeting of the Association will be held at the Westminster Technical Institute, Vincent Square, S.W. 1, on Friday, Sept. 7, at 7.30. Mr. Walter Hole, the Organizing Secretary for the Education Scheme, will deliver an address giving particulars of the scheme, and answer any questions.

THE SHIPPING ENGINEERING EXHIBITION.

A Convincing Vision of Modern Enterprise.

THE Shipping Engineering and Machinery Exhibition was opened last Friday by VISCOUNT CURZON, M.P., in the presence of a distinguished gathering of engineers and leaders of commerce. Though trade is more or less stagnant, the exhibition shows that enterprise is very much alive, and proves that inventive genius is not governed by economic laws, but that it will do the work prompted only by the law of self-expression. The size of Olympia is impressive, but the architectural features of the building can hardly be said to be of a dignified character; and yet, above all other things, the exhibition had a peculiar atmosphere of dignity. Perhaps it was the grand tradition of British shipping engineering which stirred the imagination. At any rate it served to show that the value of tradition can be measured in terms of present achievement, in the great will to create, in the realization that rest is motion. The gas industry, too, has a splendid past, which should be an inspiration to present endeavour to keep abreast with modern developments in the engineering world. The exhibition will be visited on Sept. 10 by the Institution of Gas Engineers and by the London and Southern District Junior Gas Association; and all connected with the gas industry will find many of the exhibits of absorbing interest. Before passing on to a description of a few of these, a statement made by Mr. W. A. Appleton, C.B.E. (Secretary to the General Federation of Trade Unions), at the inaugural luncheon may be mentioned. He said that further trade depended very greatly on two factors —intelligent anticipation and efficient advertising. They are set down here because they seem to apply with much force to the future prosperity of the gas industry.

A NOVEL PITOT-TUBE DEVICE.

When the Pitot-tube method of measuring the flow of gas in mains has been adopted, it has been found that in many cases the difference between the static and dynamic pressure heads was insufficient to obtain an accurate measurement on the manometer. To obviate this difficulty, Messrs. George Kent, Ltd., have brought out an excellent device. A 2 in. hole is drilled in the main, and the pitot tube is inserted. An attachment thereto consists of a telescopic fan, which is made to open out in the main. This restricts the effective area of the pipe and consequently increases the velocity of the gas stream at this point. The difference of pressure is then easily measured. These fans are made in sizes suitable for mains of different diameters; each being calibrated to allow of a direct measurement. The latter is effected by Kent's curved-tube manometer, which is already well known to gas engineers. As the connection between pressure difference and volume is not a linear relationship, an ordinary upright scale is too cramped at low pressures for accurate measurement. The curved tube, being a square-root curve, results in an equally-spaced scale from about one-fifteenth of the maximum flow upwards. The manometer scale is clear and easy to read; the meniscus of the liquid giving a definite line the position of which can be read to one-hundredth of an inch without difficulty. The design is such that there is no appreciable variation of the zero with changes of temperature. This novel invention will be of great interest to gas engineers; and it is hoped to give a fuller description of the new patent in a future issue of the "JOURNAL." When metering dirty gas it has been found that the usual form of orifice which is successfully used for comparatively clean gas, compressed air, or steam, is not suitable, owing to deposit settling on the edge and faces of the orifice. This deposit alters the coefficient of discharge, causing the meter to read fast. In order to overcome this difficulty, Messrs. Kent have designed a self-cleansing orifice, which in practical working has proved satisfactory. This cannot fail to attract attention.

FURTHER DEVELOPMENTS IN THE HELE-SHAW FILTER.

The exhibit of the Hele-Shaw streamline filter formed a centre of great interest. An account of the working of this ingenious contrivance—the successful outcome of scientific research—was given in the "JOURNAL" for July 18, p. 307. Mention was made in this article of the application of the filter to the treatment of effluent liquor from gas-works; reference being made to the "rodding-out" of the deposit from the periphery of the tubes. Since then, however, considerable development has taken place; and a happy means has been arrived at of automatically clearing the sediment as it is formed. Its simplicity and certainty of action, which are in true keeping with the simplicity of the filter itself, appealed to us strongly. Briefly, it consists of a floating piston, worked by hydraulic pressure, which descends the tube and carries with it the deposit, which it discharges into a hopper at the end of its stroke. This floating piston is brought into action when the resistance to fluid penetration of the sediment causes an appreciable increase in the pressure required to maintain a constant volume output of filtrate. Its advantages are at once apparent. In the first place, it does not interfere with the filtration process; in the second, it obviates wastage of water necessitated by the flushing method of deposit removal. We were privileged to see a demonstration of the treatment of gas-works effluent; and the separation effected was remarkably efficient. An amusing point was mentioned in reference to practical tests, when it was discovered that the filtration was so thorough that the ammonium salts were separated from the liquor. However, this was soon remedied by adjustment of the "molecular grid" formed by the sheets of paper. There were many features of interest and importance in connection with the Hele-Shaw filter, but space forbids a lengthier description. A model of a plant capable of dealing with 10,000 gallons of water per hour, comprising sixteen columns each containing 16,000 sheets of paper—256,000 sheets in all—must have engendered dreams of future applications in the minds of many appreciative visitors to the exhibition.

GAS-FIRED BOILERS.

Examination of the exhibits of Messrs. Spencer-Bonecourt, Ltd., is undoubtedly causing great satisfaction to enthusiasts of efficiency and fuel conservation. The recovery of waste heat, though of such vital importance to industry, is only now beginning to be recognized as one of the most important factors in that revival of trade to which all look forward. For such recovery Kirke patent waste-heat boilers have been installed in some of the largest gas-works in the country. As an example of their working results, it is interesting to quote those obtained from an installation at Macclesfield, where a single boiler is evaporating on the average 750 lbs. of water at 60° Fahr. to steam at 100 lbs. per sq. in. pressure; the maximum evaporation in one day being 21,000 lbs. This means that, by one boiler, as much steam is evaporated from waste heat as could be generated from 350 tons of good steam coal per annum. An interesting departure in Kirke waste-heat boilers was made recently in the case of Neath Gas-Works, where, in addition to the tubes fitted for utilizing waste heat, other tubes were fitted which could be fired with producer gas to increase the evaporation when the waste heat available was insufficient to generate the whole of the steam required. Visitors to the exhibition are attracted by the automatic control of the gas supply. This is effected in a simple manner. A diaphragm is in connection with the steam pressure of the boiler. If this becomes excessive, the movement of the diaphragm is transmitted to a butterfly valve in the gas-supply pipe, which diminishes the flow of gas to the burners. When the pressure becomes normal, the reverse movement of the diaphragm re-opens the butterfly valve. The control is, of course, adjusted to meet any requirements. The Kirke boiler, which was described fully by Major Gregson in a paper read to the London Junior Gas Association [see "JOURNAL," Vol. CLXII., p. 351] differs considerably from the original Bonecourt boiler, not only in respect of the refractory packing, which has been replaced by a soft iron spiral, but also in that there is no primary aeration of the gas. In spite of this, complete combustion takes place, with only 10 p.ct. excess of air over the theoretical requirement. The recent improvements in the various patterns of boiler are too numerous to mention here.

GOOD PAINT *v.* CORROSION.

No one will deny that a retort-house is not a good store room for corrodible materials. Particularly is this the case where an immense cloud of steam floats round the tie rods and girders of the structure and the ironwork of the setting every time coke is discharged from the retorts, a feature which is part and parcel of many carbonizing systems. At the same time it is felt that much damage could be reduced by the use of first-class paint well applied. The last term—well applied—is used because no paint will stop corrosion unless it be applied to a dry surface in the first instance. Neglect of this precaution is often the cause of unfair complaint. The exhibit of Graphite Products, Limited, was therefore of interest, for the claims put forward for their "Foliac" graphite paints are high. That their statements are wholly justifiable is amply proved by the practical results obtained by the use of their non-corrodible paints for purifiers, gasholders, and structures in general. Other points of note lay in the applications of "Foliac" graphite compound for the jointing of pipes, for the headers of Babcock and Wilcox boilers, in connection with the casing joints of steam turbines, and for rendering gasholder plates thoroughly gas-tight—to mention but a few.

SCIENTIFIC TEMPERATURE CONTROL.

Scientific control of working conditions is indispensable; this and efficiency go hand in hand. A new disappearing filament pyrometer constructed by the Cambridge and Paul Instrument Company, Ltd., is a simple and inexpensive instrument for use where a high degree of accuracy is not required. Capable of measuring temperatures up to 2100° C., it consists of an electric lamp connected in series with a small ammeter and a rheostat; current being supplied by a 2-volt accumulator. The observer looks through the lamp at the hot body—the combustion chamber of a retort setting, for example—and adjusts the electric current by means of the rheostat until the tip of the filament is of the same brightness as the hot body, when it merges into the background and cannot be distinguished. The temperature is then read on the ammeter scale, which is directly calibrated in degrees. If too much current is passing through the lamp filament, the latter appears as a fine line on a darker background; and if the current is insufficient, the filament is a dark line on a light background. Another highly interesting exhibit by this firm was an automatic temperature control device; a standard outfit for regulating the temperature of gas-fired furnaces being demon-

strated. It consists of an indicator connected to a thermo-couple so placed in the furnace that it gives a true indication of the temperature conditions. This works in conjunction with a balanced valve. When the temperature becomes too high, a solenoid is energized, which results in the temporary closing of a by-passed gas supply until normal temperature conditions are once more attained. Gas engineers will find that time spent at this stand will not be time wasted.

ATOMIZATION.

It is unnecessary to enlarge on the general products of the Aerograph Company, Ltd., whose appliances are in use in gas-works throughout the country, for painting structures, meters, &c., and for atomizing naphthalene solvents into gas-mains; but a noteworthy feature of this Company's stand was in connection with a new apparatus for the oxidation of oil. On first thoughts, it might be imagined that such a process is not in the realm of gas engineering; but when the importance of good paint is considered in relation to the balance-sheets of gas undertakings, it is an invention of no little moment. The "Engleoxidizer" is the outcome of research work at Loughborough College—an Institution which, by the way, has already reached a high status—and consists of the atomization of superheated air, purified from water-vapour and carbon dioxide, through the oil, in conjunction with a ray of light. The very intimate contact gives complete oxidation; and the oil produced, used as a vehicle for pigments, results in a paint which dries rapidly throughout, with no tendency to "skinning."

A NEW BALANCED-DRAUGHT STOKER.

Doubtless the success which attends Messrs. Babcock and Wilcox, Ltd., is due to their keen foresight, which enables them to keep well abreast of the times; and among the exhibits of this firm were two new improvements in connection with their products. One of these was a novel design of driving gear for their mechanical stoker, by means of which no less than eight different speeds can be obtained, so that regulation within very fine limits is assured. The primary driving mechanism is a specially designed epicyclic gear, running in oil, from which a train of pinion wheels transfers the necessary power to the main grate-driving shaft. The epicyclic gear is permanently connected to a small electric motor by means of a short chain drive, each stoker having its own separate motor. The whole is enclosed in a casing and mounted on the side frame of the stoker, so that the complete grate can be withdrawn with the driving gear intact. Inequalities in the fuel bed frequently demand differing degrees of under-grate air pressure at varying stages of combustion; and provision is made for this by means of air compartments, so spaced in the length of the grate that varying pressures can be applied on approximately each section of two feet. Under each air chamber is a fine-ash hopper extending across the full width of the grate. These hoppers are automatically opened at definite intervals by means of sprockets gearing into the under-side of the grate links, and are so constructed that no loss of air pressure occurs during the time the discharge into the ash pit is taking place. Another innovation is in connection with soot removal from boiler tubes. This consists of a tube the perforations of which correspond to the pitch of the boiler tubes. When required, steam is injected into the cleaning device and, following the path of the products of combustion, clears the deposited soot from the tubes. The economy of fuel due to this elimination of non-conducting material is considerable.

A SELF-OILING PULLEY.

How many workmen revel in the joys of climbing the jib of a giant crane for the purpose of oiling the pulleys? Believing this question to be easily answerable, a short description of one of the exhibits of Messrs. Stothert and Pitt, Ltd., will not be out of place. This is the "Lawrence" self-oiling rope pulley, which has been specially designed to overcome the defective lubrication frequently experienced on cranes where, on account of difficulty of access, any ordinary type of lubricator does not receive proper attention. The pulley is made from two circular steel plates pressed to shape, rivetted and welded together, and provided with a cast-iron hub bushed with gunmetal. The space between the plates forms the oil container, and the oil is fed to the bush by three fixed radial guides permanently welded to the pulley. It has been found that, when working under severe conditions for eight and a half hours a day, the oil capacity is sufficient to last twelve months without re-filling. The stand of this firm is most attractive; and the exhibits include their well-known rotary pumps and a fascinating model of a giant crane.

COMBUSTION CONTROL.

For fuel economy, a regular and systematic check either on the flue gases from furnaces, where complete combustion is desirable, or upon the evolved gas from producers is of first importance. In skilled hands, a carbon-dioxide recorder is a useful adjunct to a boiler-house; and an instrument for such conditions should be simple and robust. The "W. R." carbon-dioxide indicator, manufactured by Messrs. W. R. Patents, Ltd., fulfils both these conditions. The gases to be tested are passed through a filter and thence into a chamber containing a porous pot filled with an absorbent reagent. A pipe connects the chamber with a vessel containing water, into which dips one end of another pipe connected with the porous pot. As soon as absorption commences, a vacuum is produced; and the percentage of carbon dioxide is read direct from the gauge. Another indicator, for the control of water-gas plants, was fully described in the "JOURNAL" for Feb. 7, p. 336.

Other admirable gas-analysis recorders of a wide range, for estimating and recording carbon dioxide, oxygen, combined carbon dioxide and oxygen, sulphur dioxide, and chlorine, are exhibited by Messrs. Walker, Crosweller, and Co., who also show their "Arkon" combined gas-volume recorder and indicator. This instrument measures the differential pressures set up by an obstacle placed in the gas stream. This may consist of a throttle disc or throttle nozzle, embracing the whole of the gas stream, or a Pitot tube, Brabbée tube, or similar device which works only at points in the stream. The throttle is usually to be preferred. It causes a slight loss of pressure, however; and where this loss is not permissible, it is necessary to use the single-point measurement. In general, the greater the pressure difference, the greater will be the accuracy.

EFFICIENT JOINTING.

There is much evidence to prove that the problem of efficient jointing is receiving as much attention as its importance merits. Messrs. W. H. Dorman and Co., Ltd., are showing their patent expansible and flexible joints in both steel and other metals, from ¼-in. to 16-in. bore. These "Flexstel" joints are used extensively in gas-works. Extensive and severe tests have been taken to prove their durability. A ½-in. bore pipe-line was submitted to the National Physical Laboratory for destructive test. It ultimately gave out under a pressure of 9·2 tons per sq. in., when the pipe-line metal actually fractured; the joint being perfectly fluid-proof till fracture occurred.

Messrs. Thomas and Bishop, Ltd., demonstrate their "Permac" jointing material. In the course of manufacture this material passes through seventeen different operations; each phase being under the supervision of an expert, and each individual constituent in its construction being subjected to the strictest examination and inspection in order to arrive as near as possible to a uniform standard in every batch of material manufactured. The substance referred to is in powder form, and requires mixing with boiled linseed oil to the consistency of a stiff putty, when it can be applied direct; full pressure being applied immediately after the joint is made. By this method a rustless metal-to-metal joint to withstand extreme pressures of steam, superheat, ammonia, creosote oil, gas, and picric and sulphuric acids is formed, and remains unaffected by condensation.

Another joint which attracts much attention is the well-known "Victaulic" manufactured by the Victaulic Company, Ltd. This is an economical pipe joint which can be fitted in a moment by unskilled labour, is thoroughly leak proof, couples the pipes, and yet is flexible under pressure, and possesses the advantage that no exact aligning of the pipes is necessary. In consequence of the latter fact, pipes can be laid on undulating ground without any of the serious difficulties often experienced. The "Victaulic" tube expander expands the tube ends cold to the required dimensions. Short lengths can be prepared and installed in awkward places, and closures can be quickly made. This jointing has been used extensively in the Provan gas-works.

The subject of jointing makes it necessary to mention the work of the Anglo-Swedish Electric Welding Company, Ltd., who are responsible for many excellent repairs in various gas-works in the kingdom. The claims of this firm are high, but are based on the results of exhaustive tests, most of which were carried out at the laboratories of the Royal Naval College, Greenwich, or at the testing works of Messrs. David Kirkaldy & Son. The pleasing feature of this system is the ease and rapidity with which repair work can be executed, and the remarkable strength of finished joints. For example, determinations were made on two test pieces of rectangular section, 1 in. wide by ½ in. thick, composed wholly of deposited metal. The mean value of the modulus of elasticity, 13,100 tons per sq. in., was nearly the same as that of ordinary steel plate in good condition.

Under this heading it is appropriate to refer to the "Vislok" triple lock nut, which saw the light of day over ten years ago, and from the outset has withstood the searching test of practice. The ingenuity of the makers—Messrs. Vislok Limited—is evidenced in their showcards at the exhibition, one of which depicts a fight between the vibration demon and the "Vislok" nut; the victory going to the latter in an easily-won fight.

OTHER INTERESTING EXHIBITS.

Efficient lubrication depends upon two things—a well-designed system and the employment of good oil. First cost of the latter commodity should not be the ruling consideration. An examination of the products of the British Petroleum Co. and of Messrs. Price's Patent Candle Company will be of value. The latter firm have published an excellent little book dealing with the instruments and apparatus used for testing oils, which explains fully the methods employed for physical and chemical tests, and shows how the knowledge gained may best be applied. A well-designed apparatus for the separation of oil and water is shown by Messrs. R. C. Knight and Dunford Smith. This consists principally of two vertical conduits connected at the lower end; the inflow being larger than the outflow. The inflow conduit is provided with a diaphragm plate, steam heating coils, and an oil overflow. After filling with water, oily water is pumped into the inflow side. The oil collects in the inflow conduit, passes the heating coils (which assist the separation and reduce the viscosity), and flows through an overflow pipe to a settling tank. Messrs. Newall's Insulation Company Ltd. have a good display

of their insulating materials, as also have Messrs. Hobdell, Way, & Co., Ltd.; and near at hand, the exhibits of the Industrial Waste Eliminators, Ltd., and of Messrs. P. Wilkinson & Sons (who demonstrate what an easy matter it is to bend narrow-gauge tubes without filling) are full of interest to the gas engineer.

It has been impossible to give more than a sketchy outline of those particular exhibits which should not be missed by gas engineers visiting the exhibition; but it must be added that the other stands are full of general interest. A fascinating vice is shown, for example, which will hold the most fragile and unwieldy articles firmly; and this will doubtless find its place in many of the repair shops of gas undertakings. This vice is made by Messrs. George Nelson & Co., Ltd. Irregular objects can be held with absolute rigidity; the jaws adapting themselves completely to the contour of the most irregular-shaped article, without the use of packing. The danger of distortion when holding long and narrow work, and such articles as thin-walled cylinders, is eliminated, for the pressure is evenly distributed over the entire surface.

ATMOSPHERIC POLLUTION.

There has been published by H.M. Stationery Office, Imperial House, Kingsway, W.C., and branches, at the price of 3s. net, through the Meteorological Office (Air Ministry), a report by the Advisory Committee on Atmospheric Pollution on observations during the year ended March 31, 1922. It forms the eighth report of the Committee for the Investigation of Atmospheric Pollution.

Among the members of the Committee during the year, appointed by the Meteorological Committee, were Sir Napier Shaw, F.R.S. (Chairman), Mr. J. G. Clark (Gas Light and Coke Company), Prof. J. B. Cohen, F.R.S. (University of Leeds), Dr. H. A. Des Vœux (Hon. Treasurer of the Coal Smoke Abatement Society), Dr. J. S. Owens (Hon. Secretary), Bailie W. B. Smith, of Glasgow (member of the Departmental Committee on Smoke Abatement), and Mr. W. S. Curphey (Chief Alkali Inspector), who was appointed, when the Committee were first formally constituted, as the representative of the Department of Scientific and Industrial Research. There were also a number of members nominated by co-operating municipal authorities. The Committee record with regret the death, shortly after the close of the year under review, of Mr. Curphey. Among those on the Technical Sub-Committee are Sir Napier Shaw, Mr. Clark, and Dr. Owens.

Twelve authorities took part during the year in an investigation of the results obtained by the standard gauge for the amount of atmospheric pollution, collected and analyzed month by month; 31 gauges having been maintained and operated by them in various localities. The examination of the results is made in the form of comparison with averages. The year was one of exceptionally fine and clear weather; and the use of coal was much restricted by the memorable coal strike. Nearly everywhere the amounts of pollution collected were below the average. A new form of deposit gauge is shown; and there is a note by Dr. J. R. Ashworth on the deposits obtained at Rochdale—a manufacturing town, where there is an exceptionally high atmospheric deposit. From his calculations, Dr. Ashworth arrives at the following rough estimate of the amounts of pollution from different sources in Rochdale: Dust, 15 p.ct.; factory smoke, 66 p.ct.; house smoke and other sources, 19 p.ct. If factory smoke were suppressed in Rochdale, he says, the deposit from the air would be reduced to about 26 tons per square mile per month; and then the atmospheric pollution of the town would be no worse than that of such commercial cities as London, Liverpool, and Hull, or even that of cities such as York and Exeter.

The effect of the coal strike of 1921 on atmospheric pollution is referred to in another section of the report. The strike, it will be recalled, began on April 1 and terminated on July 4; and much attention was attracted by the extraordinary clearness of the atmosphere during this period. Though it is normally a time during which domestic heating fires are not in operation, the reduction of impurity was obviously greater than could be explained by this cause. To bring out the effect of the strike in this connection, a curve is included which indicates the remarkably low level of impurity reached during May, June, and July. During April there was a steady reduction of impurity, as available stocks of fuel became exhausted.

Allusion was made in the last report to a method of examination of dust particles which had been devised by Dr. Owens. A considerable amount of work was done in the year under review in developing this method; and an apparatus of an extremely simple form has been designed which, it is felt, opens-up new possibilities of research into the suspended impurities in the air. The apparatus is fully described and illustrated; and some of the methods which have been used for dust measurement are set out.

Flueless Heating Stoves.—A bulletin issued by the Smithsonian Institute, of Washington, says that there are many so-called "odorless," "smoke-consuming," and "chimneyless" gas-heating appliances in use. The gas industry should grow with increasing demands for incidental house heating; but this growth may be retarded by untruthful claims that flues for room and water-heating devices are not needed. Vitiated room air conditions must be prevented if there is to be an increasing use of manufactured gas for heating service.

"N.P.K." FERTILIZER.

Questor's Rejoinder.

IN replying finally to Mr. Lloyd Pease's further observations on the above subject [see *ante*, p. 529], the writer has no desire to assume the rôle of an iconoclast. The object in view is merely to shed a ray of light, as a result of practical experience, on the Pease proposal, which, while sound and illuminating in some respects, is somewhat nebulous in others. As none of the arguments Mr. Pease submits is unanswerable, it is proposed to reply to his rejoinder point by point, *seriatim*.

The underlying financial consideration is not so much a question of the price paid by the small consumer for compound fertilizers, or the wholesale price of unmixed ingredients, or the question of gas-works selling a mixed fertilizer in small lots in their localities, but rather *the price at which "N.P.K." fertilizer, of given chemical composition and of uniform texture, can be manufactured, as contrasted with an identical compound fertilizer produced by the admixture of the constituent ingredients.* To bandy words about minor matters such as loom large in the second paragraph of Mr. Pease's rejoinder, is futile.

What are the essential considerations governing the relative costs of production? They are four in number—(1) The respective unit prices of ammonia; (2) the unit price of K_2O; (3) the respective unit prices of P_2O_5; and (4) the cost of producing "N. P. K." fertilizer, as compared with the cost of admixing the various ingredients constituting a compound fertilizer of identical composition and physical characteristics. It will be well to examine these considerations separately, in the light of Mr. Pease's second contribution.

(1) The unit price of ammonia recovered from coal or coke-oven gas must be viewed in its relation to the unit price of ammonia in sulphate of ammonia. Apparently Mr. Pease does not contest the relative figures included in the cost sheets under discussion—viz., 4s. 6d. per unit, as representing the probable cost in the Pease process, as against 11s. 9d. per unit which the fertilizer manufacturer using sulphate of ammonia would have to pay at the present time. Absence of comment by Mr. Pease on this aspect implies general and mutual agreement.

(2) Similarly, it would appear that there is mutual agreement in the matter of the unit price of K_2O. There is no reason to suppose that works operating the Pease process would be able to purchase sulphate of potash at a cheaper price than that at which established fertilizer manufacturers can buy.

(3) The crux of the controversy as regards the financial aspect centres round the unit price of P_2O_5 in the two products—(*a*) phosphoric acid, and (*b*) calcium superphosphate. It is certainly at this juncture that we join issue. In arriving at the unit price of P_2O_5 for cost-sheet purposes, as representing the "N.P.K." process, the mean of the unit prices of phosphoric acid and calcium superphosphate (in bulk) was taken. It was believed that this would be accepted as a reasonable appraisement. Whatever may be the degree of unreasonableness attaching to such a method, and to the figure arrived at, it is equally unreasonable to suggest, as Mr. Pease does, that the unit price of phosphoric acid would be represented by 4s. 9d., taking superphosphate (16 p.ct. P_2O_5) at 65s. per ton, *plus* the cost of the additional sulphuric acid.

It is with confidence that the writer leaves the consideration of the merits of the two methods to the judgment of your readers. It is, however, desirable to remove this aspect outside the orbit of opinions, and to bring it to the bedrock of fact. Does Mr. Pease really believe that a weak crude phosphoric acid can be manufactured with the same ease, and with the same steam, fuel, repairs and maintenance, and labour costs, as calcium superphosphate? All his assumptions and inferences as regards price inevitably lead one to this conclusion. Has Mr. Pease read the article appearing in the "Chemical Age" of June 30, wherein Alex. Ogilvie, A.M.I.M.E.. deals with recent developments in the manufacture of superphosphate? Has he appreciated that with a modern plant three men can produce one hundred tons of superphosphate per day, and that labour, including grinding, mixing, excavating, and depositing in the store, represents 3d. per ton, and power 1s. per ton? On the other hand, has he realized what the manufacture of weak crude phosphoric acid involves? Fritsch (second revised edition by H. B. Stocks, F.I.C., F.C.S.) says, on the subject of the manufacture of phosphoric acid:

> The raw material used is a 50 p.ct. phosphate ($Ca_3P_2O_8$). If damp, it is dried on metal plates. If lumpy, the lumps are crushed by a stone-breaker and then reduced to the requisite fineness by a flatstone mill or a ball mill. The ground phosphate is then fed into the vats by a chain elevator, 1 to 2 tons per charge; the sulphuric acid and the necessary water (wash-water containing some P_2O_5) to dilute the acid to 16° Bé. being run in at the same time. The charging of the vats requires twenty minutes; and during this time decomposition is completely effected. The phosphoric acid being liberated, the sulphuric acid has taken its place and combined with the lime to form gypsum, which has to be separated from the liquid. For this purpose the muddy liquids from the decomposition vats are collected in a receiving tank at a lower level. This is fitted with an agitator, its rôle being to maintain the solid particles in suspension until the mixture is forced to the filter presses by a pump in which the acid liquid comes in contact only with rubber or lead. The filter presses used have 50 plates, and are capable of treating 14 tons of phosphate—equal to three tons of P_2O_5—in twenty-four hours. The filter plates are of pitch pine;

the frames being of the same wood or of oak. The gutters are of plum-tree wood. When the filter press is charged, its contents are washed with water under pressure until the liquid which flows away shows a gravity of only 0·25° Bé.—a density equal to that of gypsum-saturated water. The wash-water then contains, on an average, 3 p.c. of P_2O_5. It is used, as already stated, to reduce the sulphuric acid to 16° Bé. The phosphoric acid collected in a "weak solution" tank has a density of about 12° Bé., say, about 4° Bé. less than the sulphuric acid used. There is reason to conclude that in addition to liberating the phosphoric acid, a part of the latter has combined with the lime present in the phosphate as $CaCO_3$, CaF_2, and $CaSiO_3$. A weak phosphoric acid solution of average quality has the following composition: P_2O_5, 8·0 p.c.; SO_3, 0·2 p.c.; CaO, 0·4 p.c.; Fe_2O_3 and Al_2O_3, 0·3 p.c.; and small quantities of HF, Si, MgO, &c. For most applications, especially for the manufacture of double superphosphate, the phosphoric acid must be concentrated to a certain extent. At first, attempts were made to concentrate it by evaporation, using lead steam coils; but the pipes became rapidly encrusted with lead salts and lost their conductivity for heat. This process was therefore abandoned, and attempts were made to concentrate the acid by bottom heat. Great flame ovens were constructed, heated by combustion gases. These gases are led underneath the liquid contained in a pan surmounted by an arch. The pan is of strong wrought iron, lined inside with stones which resist acid, and thus is protected from direct contact with the flame and the phosphoric acid. On the other hand, the exterior side of the pan is unprotected. The dilute solution of phosphoric acid runs in continuously in the back part of the pan, until, after two or three days, an average concentration of 50° Bé. is obtained. The concentration is then finished; and the phosphoric acid, now indicating 56° to 58° Bé., is finally run out by a central gutter, while the contents of the pan are continuously agitated so that no mud remains. The liquid is collected in wooden vats or in lead-lined iron tanks. In this condition the phosphoric acid is turbid and blackish, owing to the presence of soot deposited by the combustion gases. It contains about 54 p.c. of P_2O_5, 1·5 p.c. of Fe_2O_3 and Al_2O_3, and variable amounts of gypsum, phosphate of lime, calcium fluoride, hydrofluosilicic acid, arsenic, &c."

Having presented an outline of the two manufacturing operations, which will enable your readers to visualize what is involved, it is believed that the issue can be narrowed by the submission of cost details showing the principal items having reference to the manufacture of phosphoric acid and calcium superphosphate.

Cost of Manufacture of Crude Weak Phosphoric Acid.

[12 P.Ct. P_2O_5.]

—	—	Cost per Unit of P_2O_5.
	£ s. d.	s. d.
37 cwt. 70 p.c. Florida phosphate at 8d. per unit = 46s. 8d. per ton	4 6 4	1 9·5
40 cwt. 115° Tw. sulphuric acid at 2s. 3d. per cwt.	4 10 0	1 10·5
Power, steam, water, &c.	0 5 6	
Fuel for partial evaporation	1 5 0	1 8·1
Labour	2 10 0	
	£12 16 10	5 4·1

Production, 4·0 tons of 12 p.c. P_2O_5 weak crude phosphoric acid, or $4 \times 12 = 48{\cdot}0$ units of P_2O_5,

$$\frac{\text{s.}}{256{\cdot}8}{48} = \text{5s. 4·1d. per unit.}$$

Cost of Manufacture of Calcium Superphosphate.

[35 P.Ct., 16 P.Ct. P_2O_5.]

—	—	Cost per Unit of P_2O_5.
	£ s. d.	s. d.
10½ cwt. 70 p.c. ground phosphate rock at 8d. per unit, or 46s. 8d. per ton	1 3 11	1 5·9
10½ cwt. of sulphuric acid, 115° Tw., at 2s. 3d. per cwt.	1 3 7½	1 5·7
Power	0 1 0	
Labour	0 0 6	0 1·1
	£2 9 0½	3 0·7

$$\frac{\text{s.}}{49{\cdot}04}{16} = \text{3s. 0·7d. per unit.}$$

The writer has been responsible for the manufacture of large quantities of phosphoric acid and superphosphates; and in giving cost details bearing on these manufactures he has quoted practical figures. Perhaps Mr. Pease will complain that the monetary statement having reference to the production of crude weak phosphoric acid only contemplates an efficiency of about 80 p.c. on the phosphate used, and that 10 p.c. more sulphuric acid is charged than is theoretically required. If questions of this kind are raised, the reply is that the figures reflect practical results on works where the plant is well designed and satisfactory, and where the supervision is efficient. Loss of phosphoric acid can be reduced below 20 p.c., but only at the risk of increasing the expenses of evaporation, owing to the production of a very weak phosphoric acid solution, due to large quantities of water being used. Obviously, a medium course has to be pursued. It is hardly imagined that an 8 p.c. P_2O_5 solution of phosphoric acid would be suitable for the "N. P. K." process. A 20 p.c. P_2O_5 solution of phosphoric acid is doubtless more convenient, and involves the use of a smaller quantity of "sponge" (peat moss, &c.). In view of this, evaporation or concentration is necessary; and it is believed that the item for fuel will be regarded as a reasonable one. The calcium superphosphate cost figures largely speak for themselves. An efficiency of 97 p.c. is counted on, from the point of view of phosphate rock, and the sulphuric acid figure is a usual one, which makes allowance for the presence of a small percentage of free acid in the final product, for the conversion of calcium carbonate to calcium sulphate, and the decomposition of fluorides, &c.

What is the deduction to be drawn from these figures? It is this. In dealing with the economic aspect in the original article, the writer took the price of phosphoric acid (1500 quality) and calcium superphosphate (16 p.c. P_2O_5), and suggested that the mean unit price derivable from these figures would represent a reasonable charge for crude weak phosphoric acid, as necessary for the "N. P. K." process. As your readers know, the respective figures were 4s. per unit of P_2O_5 for calcium superphosphate, and 7s. 10d. per unit of P_2O_5 for weak crude phosphoric acid.

Examining now the foregoing detailed working-cost figures, it will be seen that these are respectively 3s. 0·7d. per unit of P_2O_5 in superphosphate, and 5s. 4d. per unit of P_2O_5 in crude weak phosphoric acid. In other words, the ratio of the two sets of figures is very near, as is shown below.

Original Unit Figures.

P_2O_5 in Calcium Superphosphate.		P_2O_5 in Weak Phosphoric Acid.				
4s.	:	7s. 10d.	::	3s. 0½d.	:	5s. 11½d.

The actual cost figure (5s. 4·1d.) indicating that the original figures were well-nigh accurate (within 10 p.ct.), and not very wide of the mark, as Mr. Pease is inclined to suppose.

(4) This aspect, the relative costs of production, is not contested, except that it is imagined by Mr. Pease that a more homogeneous product will result from the adoption of the "N. P. K." process. This phase of the matter will be discussed later.

Leaving now the financial aspect, and approaching the other questions raised, it is appreciated that the extent of the saving of sulphuric acid depends on whether di- or tri- ammonium phosphate is obtained. The writer's contention is that nothing beyond the di-ammonium stage is likely to be reached; and hence a figure of 50 p.ct. will represent the maximum saving. What is Mr. Pease's explanation of a moisture-containing substance such as peat promoting the fixation of tri-ammonium phosphate, whereas with coke dust—equally a moisture-containing substance, usually having a content of 20 p.ct. of water—the di-ammonium stage only is reached? This leads to another contentious point as to the part played by carbonic acid. Conceivably, some ammonium carbamate (not ammonium carbonate), under certain conditions, may be formed; but this represents only one of the many possibilities. Mr. Pease's scientific advisers must know that an intricate question of heterogeneous equilibrium is involved where gaseous, solid, and liquid phases have to be contemplated. The gaseous phases are ammonia, carbon dioxide, possibly hydrogen sulphide, and hydrocyanic acid; the liquid phases are water, and phosphoric, ulmic, and humic acids; and the solid phase is potassium sulphate, which may contain a little free caustic potash. From *a priori* considerations, from a knowledge that free carbonic acid must exist in coal or coke-oven gas after the elimination of ammonia, and must come in contact with the "N. P. K." mixture, when ammonium di-phosphate is being, or has been, produced, and equally from a knowledge of the behaviour of carbonic acid and ammonium di-phosphate, no other conclusion is possible than that originally enunciated in this connection. As regards the question of toxicity, can Mr. Pease demonstrate the absence of ammonium thiocyanate in the "N. P. K." product? If not, would it not be advisable to develop cultures to determine the effect of this compound? Experimental evidence would be more convincing than the assertion that "no toxic condition has come to light." Perhaps it was never suspected until mention was made in the original reply. The authorities at Rothamsted Experimental Station would doubtless be pleased to make an examination of the "N. P. K." material, both from the fertilizing and from the toxic points of view.

Now as to the position of the extraction process. The writer never remotely suggested that the adoption of the "N. P. K." process would dispense with the usual purifiers. The words "ordinary type of oxide of iron purifiers" were merely used to identify the type of purifier, and certainly not to suggest the abandonment of such purification. As to the best position for the extractor process on a gas-works, whether it be a revolving tube, or a static type of purifier, much depends on whether or not it is regarded as necessary to remove hydrogen cyanide, so as to obviate contamination of the "N. P. K." fertilizer with thiocyanates. If this is really regarded as an essential point, a purifier containing spent oxide capable of being water-sprayed, and worked on the basis of the Williams process, would be desirable. This purifier should be placed before the extractor vessel, which would intervene the cyanide purifier and the ordinary hydrogen-sulphide purification system. Tar can best be eliminated by the employment of a Livesey washer, as the remaining tarry vesicles mechanically carried by the gas can only be effectually removed by ensuring fine subdivision such as the washer in question

affords. Is it correct to assume that Mr. Pease proposes to deal with the virgin ammoniacal liquor, representing about 50 p.ct. of the total ammonia, in the same way as he suggests for the ammoniacal liquor formed at the tar extractor? In any case, it would appear that the proposal is a retrograde one, for all the objections urged against, and which presumably led to the abandonment of, the direct saturation process of gas liquor with sulphuric acid apply to his proposal with equal cogency.

Another consideration which occurs to one at this juncture is as to how far it is desirable for gas-works to produce two distinct ammonia products. Certainly, one can appreciate the advantage of a "whole hog" process — be it sulphate of ammonia or "N. P. K." fertilizer—as contrasted with arrangements involving part production of sulphate of ammonia, and part production of the "N. P. K." product. Moreover, the reduction of the available liquor by about 50 p.ct. may conceivably relegate an existing profitable process to the limbo of one giving adverse financial results.

The question of a double superphosphate of suitable texture, producing an insoluble phosphate, cannot be dismissed superficially. It is known that if coal or coke-oven gas containing ammonia is passed through mono-calcium phosphate, ammonium sulphate and calcium phosphate are ultimately formed. Curiously enough, the resultant calcium phosphate is dissimilar in chemical properties to the calcium phosphate in rock phosphate. The latter is soluble in hydrochloric acid, whereas the former is citric soluble. Similarly, other peculiarities are exhibited by the resultant product when double superphosphate is used. It may be urged that the only recognized basis for the sale of calcium superphosphate in this country is water-soluble phosphate. This is true; but the day is not far distant when reverted phosphate (estimated by solubility in ammonium citrate or a 2 p.ct. solution of citric acid) will rank as almost the equal of water-soluble phosphate, as has been the practice on the Continent for several years. When this day dawns, objection to double superphosphate will cease, especially in view of its better mechanical suitability as an absorbing medium as compared with crude weak phosphoric acid.

It is interesting to know that from a chemical engineering point of view the revolving tube can be, and indeed has been, in one detail, modified with advantage. The principle of showering the "N. P. K." medium by the use of radial plates is a commendable one, as it must promote positive contact between gas and the absorbing medium. It was never suggested that there was any analogy between ammonia fixation by an acid and the absorption of hydrogen sulphide by oxide of iron. The writer is too familiar with these operations to fail to appreciate the kinetics of these processes.

It is the cost of peat moss, and the need for the use of an absorbing medium for the crude dilute phosphoric acid, which led to the suggestion concerning the employment of double superphosphate. Judging by the tenth paragraph of Mr. Pease's second article, and the reference to peat introducing an organic element, which "is rated by one eminent authority as equal to 50 p.ct. additional to the chemical value," it is inferred that Mr. Pease is dubious as to whether what is admittedly sound from a scientific point of view is likely to materialize pecuniarily. The writer has cherished many such ideals, only to find that they go awry when mundane considerations begin to operate.

The additional information which Mr. Pease furnishes on the subject of labour is peculiarly interesting, and represents a distinct contribution which will be generally appreciated by your readers. The suggestion about the use of a phosphoric-acid tower as an emergency measure to prevent loss of ammonia, introduces a complication which is bound to add to the cost of the working of the process, if only by reason of the extra capital expenditure entailed and the interest thereon. The writer has no desire to enlarge on the aspect of acid soil. It is hoped that his original remarks were convincing. The fact that "N. P. K." is basic, or neutral, is undoubtedly a consideration in its favour.

The observations anent potassium sulphate call to mind the fact that many plants have been worked for the electrolytic decomposition of sylvinite, and that a 10 p.ct. solution of potassium hydrate can be purchased cheaply on the Continent, where the plants in question exist.

Despite the various criticisms made, the writer recognizes that there are distinct merits attaching to the "N. P. K." process. It is only in some details that modification is urged. The financial aspect, however, especially when the cost of peat is taken into account, possesses an element of weakness. As regards the extract from "The American Fertilizer" of Oct. 8, 1921, all the writer need suggest is that Mr. Pease should invite the opinion of agriculturists in America on the question of the uniform character of the compound manures supplied in that country. Particularly should he make inquiry concerning the Hunso automatic mixer, as made by the Sturtevant Mill Company. It is certain that his inquiries will elicit that the latter machine ensures the highest art in the matter of uniform mixing. The writer is quite willing to abide by the decision of the American agriculturists in this matter.

Finally, the writer wishes Mr. Pease and his collaborators every success in the development and exploitation of the "N. P. K." process, and hopes that the observations made and the criticisms offered, not in any carping spirit, but merely with a view to presenting the other point of view, may at least prove stimulating and helpful.

CAUSTIC POTASH IN GAS ANALYSIS.

In a recent number of "Das Gas- und Wasserfach," Dr. K. Bunte and W. Wunsch, in a report from the Karlsruhe Gas Research Institute, discuss the effect of the degree of concentration of caustic potash used for exact gas analysis over mercury. Literature, they say, shows considerable diversity of views on the subject; some recommending the use of a concentrated solution of equal parts of potash and water, and others a dilution of 1 : 3. Comparing the vapour tensions of these two solutions at normal room temperature, it seemed not unlikely to the writers that, using the more concentrated, there might be a diminution in the volume of the water-vapour saturated gas (moisture in the burette) owing to the removal of the water vapour. At 15° C. the following vapour tensions hold:

5·572 grammes KOH in 100 grammes H_2O	=	4·489 mm.	
10·860 " " " "	=	4·356 "	
18·100 " " " "	=	4·196 "	
27·140 " " " "	=	3·898 "	∞ (1 : 3)
40·400 " " " "	=	3·470 "	
66·860 " " " "	=	2·593 "	
107·200 " " " "	=	1·547 "	∞ (1 : 1)
174·900 " " " "	=	0·638 "	

The effect of these differences on the volume of the gas is what the writers wanted to determine. Two sets of experiments were made, one with the 1 : 1 KOH, and the other with the 1 : 3 solution. The apparatus was filled with nitrogen, a quantity measured off into the burette, and for safety passed once more into the caustic potash and phosphorus pipettes. The given quantity of gas was then passed alternately into the 1 : 1 caustic potash and the phosphorus pipette filled with water, and in between was measured each time in the burette. The results found were:

Quantity at start at 82·25 c.c.	Difference	
	0·10 c.c.	= 0·12 p.ct.
KOH 82·15 "		
	0·05 "	= 0·06 "
H_2O 82·20 "		
	0·05 "	= 0·06 "
KOH 82·15 "		
	0·05 "	= 0·06 "
H_2O 82·20 "		
	0·10 "	= 0·12 "
KOH 82·10 "		
	0·05 "	= 0·06 "
H_2O 82·15 "		

The time of contact with KOH and with H_2O was in each case one minute; that is to say, after passing into either pipette, the gas remained there for one minute. The times of passage backwards and forwards may be regarded as equal. In the corresponding experiment with 1 : 3 caustic potash, the volume of gas showed no change at all throughout. For KOH 1 : 1, there is a theoretical loss of 0·4 p.ct.; for 1 : 3, one of 0·09 p.ct., assuming always a water-vapour saturated gas (H_2O at 0°C. = 4·620 mm).

Although the burette in these experiments contained water in the liquid state, it is shown in the first series that, after taking out the water vapour up to the tension of the KOH 1 : 1, further saturation of the gas with H_2O does not proceed so quickly as to preclude any chance of error; and the errors are of a magnitude which cannot be regarded as negligible for purposes of exact gas analysis. It is true, certainly, that the volume will eventually adjust itself, owing to complete saturation with water vapour. This, however, entails considerably more time, working according to the method suggested by Ott, with several stoppages for comparison with the compensation tube until a constant is reached. This, of course, eliminates any error with the use of concentrated KOH. On the other hand, it has been shown above that, in using KOH 1 : 3, the volume remains constant during the whole experiment without undue loss of time. No advantage could be established in the experiments in favour of KOH 1 : 1 as regards rapidity of absorption.

Naturally it is a different matter with regard to practical gas analysis over water, when the slight alterations in volume fall well within the permissible margin of error; while it is much more convenient to use a concentrated solution of KOH, to save constantly refilling the pipette.

Coal Problem Investigations.—Very shortly there is to be undertaken at the Carnegie Institute of Technology at Pittsburgh, in co-operation with the United States Bureau of Mines, the investigation of four coal problems, suggested by an Advisory Committee of Coal Mine Operators and Engineers. The problems are: Desulphurization of coke by steam; correlation of the coal beds of Western Pennsylvania through their microscopic constituents; fundamental research on corrosion of alloys used in coal machinery; and low-temperature tars from typical Pennsylvania coals. The factors causing mine explosions will also be considered, including conductivity and specific heat of coal. Other subjects of interest to coal operators and the ultimate consumer—such as coal washing and methods of coal storage—will be investigated during the coming year. Mr. Alfred Powell (Bureau of Mines) and Mr. John H. Thompson (Carnegie Institute) will be studying the desulphurization problem; while the other questions are in the hands of Messrs. Thiessen, Anderson, and Davis (Bureau of Mines), and Messrs. Staud, Adams, and Parry (Carnegie Institute).

A SELF-STARTING AND SELF-STOPPING INTERNAL-COMBUSTION ENGINE.

We are in a position to give preliminary details of a remarkable development in regard to an auto-mechanical device for starting and stopping internal-combustion engines, invented by Mr. E. Campbell Maccormac, of Messrs. Daniel Adamson & Co., Ltd., Engineering Works, Dukinfield, Manchester. If the avowed facts of the case prove accurate, engineers and other power users will have available an automatic engine which will start and stop itself without any electrical equipment (other than the engine magneto).

The popularity of the electric motor is largely accounted for by the fact that it lends itself to automatic control. The simplicity of automatic electric control has made its adoption practically universal in the case of motor-driven pumps, hydraulic accumulators, and air compressors. In these three typical cases, the water level in the tank, the height of the hydraulic accumulator, and the air pressure in the receiver, are maintained between maximum and minimum limits automatically and according to demand. There are, however, thousands of cases where electric power is not available, and where the cost of an attendant on the spot is prohibitive during the day, and where a night shift is also out of the question. It is for installations such as these that this automatic engine device has been invented.

The object, then, is to cut-out the multiplication of heavy establishment expenses in the maintenance of a staff of superintendents, assistants, and workmen in the engine-house. No attention is needed to stop and restart the engine during the day or night; and, since the engine automatically adjusts itself according to demand, a considerable saving of fuel will be effected. Take the case of a pumping scheme where the flow to the pump is intermittent. It is desirable to have an engine that can be automatically controlled by the rise or fall of the liquid in a receiving well or sump; in other cases it may be necessary to control the engine by the rise or fall of liquid in the delivery tank; while in the case of an air-compressing plant it becomes essential automatically to start and stop the engine according to the maximum and minimum pressures in the air receiver.

This automatic engine, we are informed, lends itself readily to all these functions; and further details of this interesting invention will be given at a later date.

THE DISSOCIATION OF COPPER OXIDE IN GAS ANALYSIS.

UNDER this title, Dr. Karl Bunte and W. Wunsch, in a recent number of "Das Gas- und Wasserfach," published the results of a series of observations made in the Karlsruhe Gas Research Institute.

In the determination of nitrogen by analytical methods that entail combustion over incandescent copper oxide, the residuary gas after the combustion should be passed a few times slowly over the copper oxide while the latter is still slightly, but in the dark distinctly, incandescent. Otherwise oxygen will be found in the residual gas.

Though this has been recognized for some time, numerous results of analyses, the authors state, have shown that the important fact of the splitting of oxygen from copper oxide is often overlooked. It rests upon the dissociation of copper oxide at high temperatures. According to Wöhler and Voss, the CuO dissociation, or O_2 tension of CuO, at various temperatures is:

960° C. .. 50 mm.	1020° C. .. 174 mm.	1050° C. .. 314 mm.
1000° ,, .. 118 ,,	1030° ,, .. 212 ,,	1060° ,, .. 380 ,,
1010° ,, .. 142 ,,	1040° ,, .. 258 ,,	1070° ,, .. 458 ,,

In order to call attention to these facts, the following experiments were carried out in the Institute.

EXPERIMENT NO. I.—NITROGEN.

After thorough rinsing of the apparatus, a measured volume of pure nitrogen was passed six times to and fro over copper oxide at 270° C. At this temperature, the volume of N_2 remained constant, indicating that there was no dissociation of CuO. The experiment was carried further by heating the CuO to bright-red heat*, with this result:

Before heating	87·75	5·11 cub.m. O_2.
After ,, ...	92·86	

This showed that the splitting-off of oxygen had assumed important dimensions at this stage. Naturally the cooling of the CuO tube was omitted for the purpose of the experiment.

EXPERIMENT NO. II.—METHANE AND NITROGEN.

The next experiment was carried out by absorbing the O_2 contained in the gas mixture. Then followed the combustion of the CH_4, the determination of the final increase in volume, and the absorption of the combustion CO_2 and of the O_2 from the copper oxide.

(*a*) Strong combustion at cherry-red heat, without subsequent passage of the gas over the oxide while the latter cooled off. Determination of the separated oxygen by means of phosphorus:

Reading	74·10	0·60 = 0·81 p.ct. O_2 in gas mixture
After absorption by phosphorus . .	73·50	0·75 = 1·01 p.ct. increase, apparently ethane
After passage over incandescent CuO	74·25	2·90 = 3·92 p.ct. of CH_4
After absorption of the CO_2 . . .	71·35	0·70 = 0·94 p.ct. O_2 from CuO
O_2 absorption by P_4.	0·70	

The volumetric increase, which might be mistaken for ethane, is therefore shown to be O_2 from the CuO—1·01 increase in volume, 0·94 O_2, difference 0·07.

(*b*) Very strong combustion at bright cherry-red heat, without subsequent passage over the oxide at dull-red heat. Determination of the separated oxygen by means of phosphorus.

Reading	70·30	0·60 = 0·85 p.ct. O_2
O_2	69·70	5·25 = 7·45 p.ct. increase, due to O_2 from CuO
After combustion	74·95	2·70 = 3·84 p.ct. of CH_4
CO_2 absorption	72·25	5·20 = 7·40 p.ct. O_2 determined directly.
O_2 absorption by P_4.	67·05	

(*c*) Moderate combustion at dull-red heat, without subsequent passage of gas at diminishing temperatures. Determination of oxygen by phosphorus.

Reading	70·90	0·60 = 0·85 p.ct.
O_2	70·30	0·00
After combustion	70·30	2·75 = 3·88 p.ct. of CH_4
CO_2 absorption	67·55	0·00
O_2 absorption	67·55	

CONCLUSION.

In working by combustion over copper oxide, therefore, a high temperature should be maintained in order to carry out the combustion as rapidly as possible. After combustion, the oxygen which has been released must be returned to the CuO—now partially reduced—by passing the gas several times to and fro over it while its temperature is lowered to about 400° C. The authors' experiments indicated that three times slowly through the copper-oxide tube sufficed. As the determination of C_2H_6 by the copper-oxide method depends upon volumetric increase, it is essential that the dissociated oxygen be most carefully removed, otherwise incorrect values will be found. The same may be said of the Jäger method of nitrogen determination, which is mainly of value for checking the correctness of total gas analysis.

* The giving of exact temperature readings is regarded as worthless, as the tube shows wide variations in temperature at different points. The designations "red heat," "cherry-red heat," and "bright cherry-red heat" will give sufficient indication.

OBSERVATIONS ON "VITREOSIL" GLOBES.

There are many who affirm that they invariably feel warmer in a room where the floor is covered with a red carpet than in one where the covering, though of the same texture, is of a different colour. On the surface this may appear absurd, but that associations subconsciously affect us goes without saying, and it must be admitted that red rays more nearly approach the wave lengths of heat energy than do those of any other colour. Thoughts of warmth and comfort are not inopportune, for September has heralded its advent by a marked drop in temperature; and the trite observation that September precedes October hides a wealth of meaning. Whatever opinion exists as to the truth of the first statement of this paragraph, the effects of warm tints in lighting are very real; and this brings us to a consideration of "vitreosil" globes.

These globes are too well known to need any introduction to those connected with the gas industry. But to a large section of the public they are yet unknown; and it is felt that a more general familiarity with the products of the Thermal Syndicate, Ltd., would result in a satisfaction which would redound to the credit of the firm, and at the same time appeal—by reason of increased gas consumption—to gas undertakings. Let there be no misunderstanding regarding this last statement; the increased gas consumption will be due solely to the enthusiasm displayed by the public towards the general comfort ensured by this type of gas-shade. Indeed, we have made actual tests on vitreosil globes which have proved beyond all doubt their efficacy. The figures have shown that the polar curves of light distribution are different from those obtained when a plain glass globe is employed, more light being thrown in a downward direction (where it is required), but that the total light is greater for an equal consumption.

This is an interesting observation which calls for a little explanation. The material of which vitreosil globes are composed possesses a low coefficient of thermal expansion, and for this reason can be placed in closer proximity to the mantle. The rays emitted from the latter are reflected from the globe to the mantle in such a manner as to increase its temperature and consequently its light output, which is wholly dependent on the tem-

perature to which the ceria in the mantle is raised. At the same time the globe itself becomes luminous because of its acquired heat; and as it presents a large surface, its intrinsic brilliance is low. It can therefore be seen that the word comfort is used advisedly, for eyestrain can usually be attributed to light sources of high intrinsic brilliance. So much for thermal efficiency. Let us turn our thoughts to other practical considerations. Here again the low expansion coefficient of silica renders useful service in that extremes of temperature can be easily withstood. It is possible, for example, to plunge a red-hot shade into cold water without any ill effects; and this feature has led to several arresting showroom window displays where a stream of water has been allowed to fall on a lighted globe, thereby amusing children, interesting adults, and increasing gas sales. In consequence of this attribute vitreosil globes are particularly applicable for the shading of lights in exposed positions. This brings to mind the remedy effected by their use in the lighting of a certain draughty passage which had given much trouble, by way of broken globes and mantles, to the authorities concerned.

To return to thoughts of comfort, this desirable end is not usually concomitant with economy; but in the case of vitreosil globes the two are combined. The light emitted is of a nature which may well be termed "warm." In fact, an enthusiastic user recently referred to his gas-bracket as "a ball of fire." Sufficient has been writen to outline the potentialities of silica ware; further detailed information may be obtained from the manufacturers—the Thermal Syndicate, Ltd., Neptune Bank, Wallsend-upon-Tyne. (London Office: No. 28, Victoria Street, S.W.)

MAGNETIC COKE SEPARATION.

A paragraph in last week's "JOURNAL" showed M. Mougin, who read a paper on the subject before the Société Technique at their annual meeting, to be an enthusiast on coke recovery. In this long and well-illustrated paper he treated the matter under three headings—hand-worked screening, &c., methods based on density difference, and electro-magnetic processes. In his examination of the first two, there is not much of interest to our readers, the various methods and machines being dealt with in text-book fashion; and we were disappointed to find little more than a superficial reference to the third. Such processes, said M. Mougin, have lately been developed in Germany, where they have been credited with advantages which place them clearly above all other methods practised up to the present.

Electro-magnetic separation is based on the fact that clinker, in contradistinction to coal and coke, is attracted by a magnetic field owing to the non-magnetic ferrous material which is present in every sort of coal being transformed by combustion into magnetic iron compounds, which are incorporated in the ash. The actual separation is effected by a revolving drum, part of the circumference of which is magnetized. The pan-ash is fed through a hopper on to a jigging screen, which in turn feeds the material on to the top of the drum. The magnetic field keeps the clinker in contact with the drum for a fraction of time longer than the coke; and an adjustable partition is placed so as to intervene between the falling streams. It is pointed out that a single drum with one or two magnetic fields is sufficient to deal with one-quarter to two tonnes of ash per hour. Installations of greater capacity may be obtained merely by duplicating the drums, screens, hoppers, &c.

As to the advantages of magnetic treatment, it is pointed out that the coke is recovered in a dry state, and that the lighter clinkers, which in water separation remain with the coke, are retained by the magnetic field just as well as the heavier pieces. Further, comparatively small coke—8 to 20 mm., say—can be recovered, which is difficult to ensure with other processes. We hope to hear of developments in this direction.

Preventing Rusting of Ovens and Burners.—Rusting of ovens can, state the Smithsonian Institute, of Washington, almost be eliminated by opening the oven door slightly for a few minutes after the burners are lighted. This permits escape of the greater part of the moisture which is produced by combustion, and prevents too rapid condensation. Oven linings and burners are best protected from rust by the application of oil or grease, free from salt. This should be done while the oven or burner is warm, as often as may be necessary.

The German Gas Association.—The current number of "Das Gas- und Wasserfach" contains the official invitation to, and programme of, this year's meeting of the German Gas Association. This will be the 64th of the series, and it is to be held this year at Eisenach, on Sept. 18 and 19, under the presidency of Herr O. Meyer, of Dortmund, with Dr. Karl Bunte playing his usual energetic part as General Secretary. Owing to the stringencies of the times, it has been found necessary to curtail the customary "gas week," so that there will be much business to crowd into the two available days, including that of the allied institutions, such as the German equivalents of our "B.C.G.A." and "S.B.G.I.," and various coke and bye-product syndicates that are affiliated with the Association. Reports of the Commissions are to be presented; and the papers down for reading include three on producers, one on the centralization of small works, and another on heating by coke.

DETERMINATION OF PHENOLS IN COAL-TAR OILS.

The August issue of "Industrial and Engineering Chemistry" contains an interesting article by J. Bennett Hill on the determination of phenols in coal-tar oils and crude carbolic acid, in which he gives the results of his investigations into the processes employed. Many methods have been proposed from time to time, all of which are suitable if only a rough evaluation is required; but the present tests were made in order to meet the demand for greater accuracy and closer check between producer and consumer.

All successful methods are based on the solubility of phenols in caustic soda solution. They may be divided into two main classes—first, those which use the contraction in volume of the oil; and secondly, those which liberate the phenols from the carbolate solution obtained, and measure the volume of the liberated acids In the first class may be mentioned the methods of Weiss and Chapin; in the second, those of Weiss and Allen. It has been generally believed that the contraction process gave results higher than the correct values, and liberation processes lower results. The author's experience, however, has failed to bear out this impression. His conclusions tend to establish the accuracy of the simple contraction method; and this is recommended for general use on coal-tar oils in the following form.

A 100 cub.cm. sample of the oil at 25° C. is measured into a distilling flask (200 cub.cm. capacity) and distilled to decomposition; the distillate being collected in a tar-acid funnel. The volume of the distillate is carefully read at 25° C. and, if no solids have separated, is extracted with three successive portions (100 c.c.) of 10 p.ct. caustic soda solution. In each case, after the soda is added to the oil, the whole is thoroughly shaken and is then allowed completely to settle before drawing-off the soda layer. The decrease from the volume of the distilled oil before extraction to the volume after extraction gives the amount of phenols present. In the case of samples containing so much naphthalene as to show separated solids at 25° C., the temperature of the three measurements may be raised to 40° C., or even to 60° C.; extraction also being made at the same temperature. If the sample contains over 35 p.ct. of tar acids, the quantity taken for distillation should be reduced to 50 or 25 cub.cm., so as to give not more than 35 cub. cm. of tar acids. Before distillation the material should be made up to 100 cub.cm. with clean, dry kerosene. When the sample to be tested contains water, it should be removed by collecting the first few cub.cm. of distillate in a small separating funnel containing a little saturated salt solution. The water is separated and the oil added to the rest of the distillate in the tar-acid funnel. If no diminution in volume takes place on extraction, a trace of tar acids may be detected by acidifying the soda drawn off, and noting the odour.

Vacuum Conveyors for Boiler Ash.

The important problem of ash and coal handling equipment in connection with steam-boiler plants has been dealt with by Mr. Robert June, of Detroit, in the pages of the "Gas Age-Record;" this being, he says, the most difficult problem confronting the power plant operator, for on no other matter is it so easy to make a costly and almost irremediable mistake. Dealing with vacuum conveyors for ash removal, he remarks that, in this system a line of cast-iron pipe is extended from the ash pit, or from a point under the boiler-room floor immediately in front of the furnace, to an air-tight ash-storage tank. Vacuum is established in the storage tank by a motor or steam turbine drive centrifugal exhauster. An air washer is installed between the storage tank and the exhauster, to remove ash dust from the expelled air. When the exhauster is in operation, a current of air moving at very high velocity is produced in the pipe, through an intake port at the end of the line. Ashes, when introduced, are whisked through the pipe and into the storage tank. The pipe can be carried in any direction up or down, with the discharge point a considerable distance from the boiler-room; and the system is easily installed in all types of boiler-rooms, old and new. On the other hand, ashes can only be removed from one furnace at a time, as the opening of an intake near the tank will destroy the velocity at an intake farther away. Only about 2500 to 3500 H.P. of boilers can be served by a single system; above this power, additional complete systems must be installed. Of course, both pipeline and tank must be maintained in an air-tight condition at all times. Then there is a danger of explosion of ash dust and gases in the storage tank. To overcome this, the introduction of water into the pipeline has been tried; but the success of such a plan is doubtful, since a sufficient quantity of water to quench the ashes thoroughly will probably prove enough to choke the pipe with wet ashes. Water will also cause trouble by freezing the ashes in the tank in cold weather, and packing them so that their removal is difficult in other seasons. Maintenance cost is necessarily high, on account of the abrasive character of the ashes. Pipe renewals, especially bends, may be expected to be required after 6000 to 8000 tons of ashes have been handled; and exhauster repairs may be called for, in consequence of some ash dust coming through the air washer.

HOUSE HEATING BY GAS IN CHICAGO.

The use of gas for house heating in Chicago may be said to date from 1916. Early in the following year, gas rates began to rise; but strict application to the fundamental factors influencing the sale of gas-fired central heating systems has resulted in gratifying progress. Several of the factors involved in their case, say Messrs. G. C. Carnahan and H. D. Valentine, of the People's Gas Light and Coke Company of Chicago (in the course of an article contributed to the "Gas Age-Record"), are sociological. Persons are becoming more and more physically lazy and resentful of manual labour in handling fuel and boiler refuse; in their secluded and sedentary life, they are more sensitive to temperature changes, and require almost absolute thermostatic control; and finally, people are at the present time guided largely by false economy. Knowing that the characteristics of gas as a fuel for house heating in themselves solve the sociological factors of their problem, the Company concern themselves entirely with the physical aspects. Temperature conditions, the writers point out, are of vital importance. A customer desires to know in advance approximately what his seasonal fuel bill will be; but inasmuch as all conditions entering into such an estimate are variable, it is extremely difficult to make such a calculation.

It has, however, been found upon investigation that the temperatures of any particular locality, though varying from year to year, do so according to certain cycles; so that if the average monthly temperatures over a long period of years are taken, the result will generally be not greatly divergent from any one year. Such average temperatures have been plotted for Chicago covering a period of fifty years, and a curve has been drawn up showing the season's heat requirements, assuming 60° Fahr. to be the temperature at and below which artificial heat has to be supplied. In order to calculate more conveniently and accurately the monthly fuel distribution, another curve has been constructed, based on data supplied by a table showing, for the months October to May inclusive, the average temperature; the extent below 60° Fahr., which, multiplied by the days in the month, gives the "degree-days;" and the percentage fuel distribution. The total number of degree days for the heating season will represent the total heat requirement, and can be expressed in B.Th.U., tons of coal, gallons of oil, kilowatts of electricity, or dollars. The monthly heat requirements then are just a matter of percentage.

The Disaster in Japan.

The sympathy of every Britisher will be with Japan in the overwhelming disaster which has fallen upon it through the tremendous earthquake and consequent life and property destruction that have occurred. In that sympathy we have a place for the administrators, officers, and staff of the Tokio Gas Company, which has always shown such wonderful progressiveness, and has caused East to meet West in the modernity of gas plant equipment and methods. The London newspapers yesterday spoke of the contribution that gas made to the fire in the city, through the breaking of the distributing mains; but one evening paper at all events very much overdid it by speaking of a "gas inferno." Naturally, subterranean gas and water mains were bound to break under such terrible conditions. But they must have broken in countless places; and the escape of gas must have been very scattered and quickly dissipated and exhausted. If the trunk mains close to the gas-works or the gas-works themselves were shattered, the escape of the gas would have been local. We can only imagine from a consideration of the conditions that the newspapers greatly exaggerated the part that gas had in the conflagration which followed the earthquake.

Gas in Railroad Shops.

We learn from Mr. Charles W. Geiger, in the pages of the "American Gas Journal," that at the Bayshore shops of the Southern Pacific Railroad Company, about six miles south of San Francisco, gas is piped through the various departments, and is used for a number of purposes. It is employed in torches both for annealing copper pipes and for burning-off or sweating brass. The torch consists of a ½-in. pipe about 4 ft. in length, with a ½-in. by 2-in. reducing coupling, and a piece of 2-in. pipe 4 in. long screwed into the coupling. The reducing coupling has a series of $\frac{3}{16}$ in. holes for the purpose of admitting air for combustion. The operator merely inserts the 2-in. pipe into the end of the pipe to be annealed; the flame passing through the pipe, and out the other end—annealing the pipe, as it should be done, from the inside out. By this method annealing can be accomplished much quicker than by the usual plan of holding the pipe over a fire. All copper pipes are thoroughly annealed and overhauled every time a locomotive is "shopped;" and the wisdom of doing this is shown by the fact that, during more than eleven years, there has never been a failure of the steam-pipes leading to injectors. The locomotive painter uses gas in burning-off paint from the sashes and doors of locomotive cabs; and its employment has greatly increased the capacity of the operator. In the pipe shop, there are two small gas-burning forges for heating the soldering irons, which take the place of the usual torch.

REGISTER OF PATENTS.

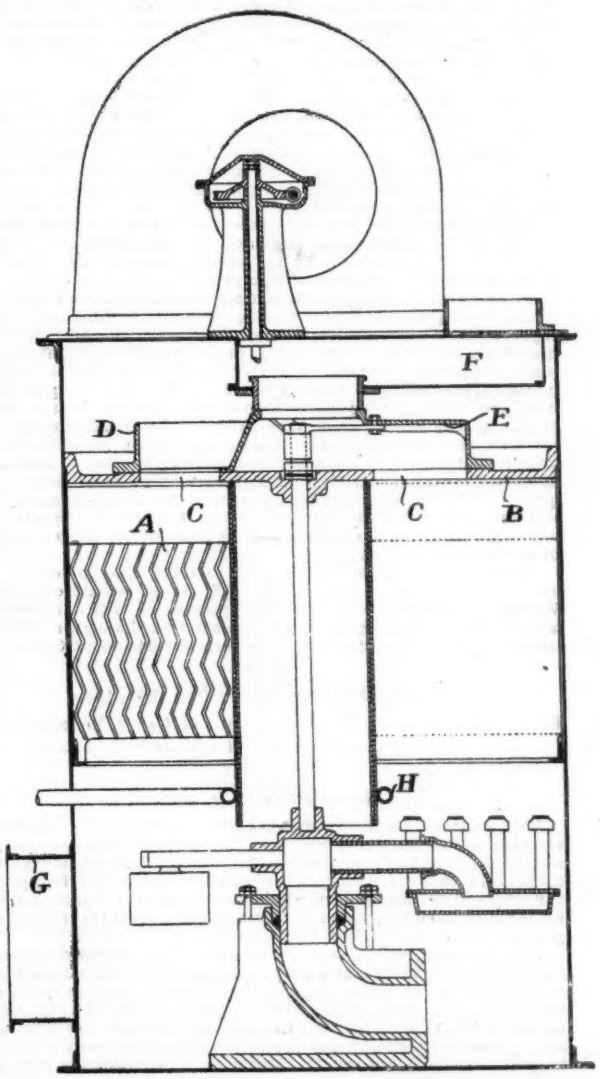
Gas-Fired Air Heating Apparatus.—No. 201,425.

KEITH, J., & BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C.

No. 22,797; Aug. 22, 1922.

This invention for heating buildings by hot air relates to gas-fired apparatus comprising a group of cells through which in succession hot combustion products and air to be heated are caused to flow alternately in opposite directions. It aims at obtaining the highest possible efficiency of gas consumption.

We reproduce a vertical section of apparatus according to the invention. It comprises a casing in the form of an upright cylinder containing eight cells arranged radially round a central tube, and a set of burners beneath the cells and rotatable round the axis of the cylinder. Each cell consists of a series of plates A presenting a large surface for absorption of heat; and the burners, arranged in a segmental group, heat three cells at a time. The cells are covered by a plate B which has ports C arranged in a circle. Rubbing on the plate



A Keith-Blackman Hot-Air Apparatus.

B is a rotary selector D. This has a plane ported portion permitting communication between three cells and the upper part of the casing, while three other cells are covered by a dished portion E of the selector D; this dished portion being connected to a flue F leading to a chimney outlet fitted with a damper. The remaining cells are closed by blank portions of the selector.

The burners and the selector are connected to rotate together, so that at all times the dished portion E is in vertical register with the burners. Surmounting the casing is a fan discharging into the upper portion of the casing; the fan spindle being coupled to a worm engaging a worm wheel which drives a vertical shaft, a pinion on which meshes with peripheral teeth on the selector D.

As to the working of the apparatus, air is discharged from the fan into the upper portion of the casing, traverses the ports C which are unmasked by the selector D, flows downwardly over the plate A in the relative cells which have been previously heated, and is discharged through an outlet opening G. Meanwhile three opposite cells are being heated; the cooled gases passing into the dished portion E, to the flue F, and thence to the chimney. The damper has to be ad-

justed with a bearing on the pressure in the lower portion of the cylinder. While three cells are being heated and three are giving up heat to the air, the remaining cells are inactive.

A pilot light tube H encircles the lower portion of the central tube, being fed by a separate gas supply which is ignited before the fan is started, or before the gas supply to the main burners is opened.

It will be seen that the casing is at all times open at the lower end, and that the pressure conditions within the casing and the adjustment of the damper determine the discharge of warm air at the opening G and of combustion products through F.

Removing Hydrogen Sulphide from Gases. No. 195,061.

PETIT, T. P. L., of Velsen, Holland.

No. 6768; March 8, 1923. Convention Date: March 16, 1922.

This invention relates to the removal of hydrogen sulphide from gases by washing with a solution of alkali carbonate or a suspension of alkaline earth carbonate; the washing liquid being regenerated by conducting through it air which may or may not contain carbolic acid.

According to the present invention, the washing liquid, which has been freed from hydrogen sulphide by a current of gas containing carbonic acid, is heated, with or without the passage of steam or inert gases through it, and the carbonic acid thus liberated is used for expelling sulphuretted hydrogen from fresh washing liquid. The carbonic acid therefore is retained in circulation.

In the regeneration process, when hydrogen sulphide is expelled, absorbed, and afterwards liberated again by heating, the washing liquid is at the same time freed from all excess of carbonic acid, and, on cooling, becomes exceptionally favourable for absorbing hydrogen sulphide. Unavoidable losses of carbon dioxide are fully compensated by that which is absorbed by the liquid from the unpurified gas together with the hydrogen sulphide.

The patentee claims that, with respect to known processes, the invention has, in the first place, the important advantage that a much smaller plant is required. In the second place, no flue gases are used; and difficult and expensive purification is thus eliminated. As compared with the regeneration process in which air with less than 2 p.ct. of CO_2 is used without heating, it has the additional advantage that, for absorbing H_2S, alkali carbonate solutions are used which are wholly free from bicarbonate, so that a much smaller absorption plant is required. The heating of the bicarbonate solution and the cooling of the carbonate solution before the absorption require little heat and little cooling water respectively, because heat-exchange apparatus may be used to a large extent. The liquid coming from the absorption apparatus may be used for cooling regenerated carbonate solution, and may thereby be preheated so that it loses H_2S more easily; and for driving off H_2S also only a small plant is required. The solution containing bicarbonate freed from H_2S is therefore also somewhat preheated when it enters the apparatus in which the bicarbonate is decomposed by heat—for instance by means of auxiliary steam or air.

A further advantage of the process is that the CO_2 content of the gas current serving to liberate the H_2S can be wholly controlled. With a high percentage of CO_2 the expulsion of H_2S is facilitated, and requires a smaller plant, but on the other hand a higher temperature is required for producing the gas current containing CO_2.

Testing Pipe-Joints.—No. 201,435.

BRITISH MANNESMANN TUBE CO., LTD., of Queen Victoria Street, E.C. 4, ROSS, D., of Newport (Mon.), and SMITH, E. S., of Swansea.

No. 23,961; Sept. 4, 1922.

This invention relates to apparatus for the testing for leakage of various types of joints in a pipe main, by means of compressed air, as soon as the joint has been completed. Two oppositely disposed interconnected obturators, suitably spaced apart, are inserted in the pipe line and arranged one each side of the joint to be tested; thereby forming an enclosed chamber, which is provided with means for creating air-pressure within it.

The obturators, which constitute the ends of the enclosed chamber, are provided on their circumferential edges with flexible tubular bands or tyres that can be inflated in order that air-tight joints may thereby be formed. The appliance includes tubular connections which afford valved communication between the enclosed chamber and a portable air-compressor or inflator, and also between the latter and the circumferential tubular bands on the obturators. The necessary inlet and exhaust cocks, and connections to pressure gauges, are covered by the patent.

When a joint is to be tested, the appliance is arranged within the pipe in a position near the joint; and the bands are inflated sufficiently to make a tight joint between them and the inner surfaces of the pipes. This done, air is forced into the chamber until a desired pressure is attained, when any escape of air through the pipe-joint will indicate that the joint is imperfect.

Dyes from Carbazole.—No. 201,624.

GALBRAITH, W. L., LEWCOCK, W., and TALLANTYRE, S. B., all of Beckton, E. 16.

No. 12,311; May 2, 1922.

This invention relates to the manufacture of dyes derived from carbazole through the condensation of the latter with *p*-nitrosophenol and its analogues. In specification No. 2918 of 1909, a process is described for the production of an indophenol dye by condensing carbazole with *p*-nitrosophenol, its homologues, or derivatives. A solution of the nitroso-compound in concentrated sulphuric acid (66° Bé.) is added, while stirring well, to a solution of the same acid of carbazole; the temperature not being permitted to rise above 30° C. From the indophenol so produced, sulphide dyes may be obtained by heating the former with alkaline polysulphides.

By modifications of this process, especially as regards the temperature of the reactions, the patentees claim, in the specification under review, to improve both the yield and the purity of the carbazole-indophenols, and to produce superior quality sulphide dyes of good shade and depth.

The improved procedure will be understood from the following example.

To a solution of 73·6 parts by weight of *p*-nitrosophenol in about 1736 parts by weight of 93 p.ct. sulphuric acid, brought (within a jacketted lead vessel provided with an agitator) to a temperature of about − 20° C. by the passage of liquefied ammonia through the jacket, were added, in successive small charges of the finely powdered solid, so as to maintain the average temperature throughout the addition as near as possible to the initial temperature of − 20° C., 100 parts of a carbazole assaying 94·5 p.ct.; the reaction-mixture being continuously and thoroughly agitated in such manner as to bring the solid carbazole rapidly beneath the surface of the acid and homogeneously to distribute it throughout the latter. When all the carbazole had been added, the reaction-mixture was maintained in agitation for about half-an-hour, the temperature being still kept at about − 20° C.

The reaction-mixture was then poured in a fine stream into about 30 volumes of dilute aqueous ammonia at a temperature of about 15° C.; the mixture being kept alkaline and in continuous agitation throughout. The temperature at the conclusion was about 35° C. The condensation product was thrown down in a readily filtrable form. The precipitate was filtered off, washed with cold water, and pressed. The product was a brownish-purple solid. It was practically completely soluble in alcoholic ammonium sulphide, and was soluble in alcohol, giving a bright violet solution, and in concentrated sulphuric acid with production of a bright blue colour.

On thionation, this indophenol yielded a first-grade sulphide dye of full strength—that is to say, as compared with the usual dye of commerce. The products obtained by condensation at temperatures substantially higher than − 20° C. yielded sulphide dyes of lower strength, but still of good quality although derived from indophenols of a degree of purity inferior to that obtained at the lower temperature in question. Lower temperatures than − 20° C. may be employed for the condensation; but, generally speaking, a temperature of this order represents that most convenient for the production of a first-grade product.

Ignition Mechanism for Gas-Engines.—No. 201,819.

DIFFENDORF, W. L., of San Diego, California.

No. 29,014; Oct. 25, 1922.

This invention for gas-engines relates to ignition mechanism of the type in which a sparking electrode projects into the cylinder, and in which a member makes contact with the sparking plug electrode in the interior of the cylinder; the two contact members being periodically separated when the piston reaches compression position.

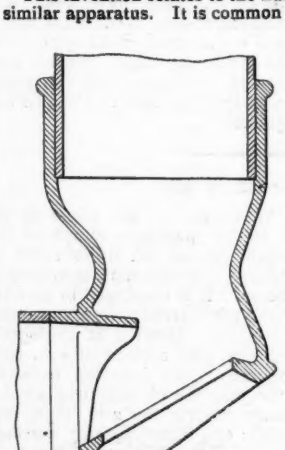
The invention is characterized by the fact that the contact member which engages the electrode of the sparking plug is constructed as a cast-iron split ring supported in the combustion chamber and carrying a contact point at its free end so positioned as to contact with the electrode.

Flues for Domestic Appliances.—No. 201,726.

RADIATION, LTD., and HARVEY, F., both of Birmingham.

No. 18,053; June 30, 1922.

This invention relates to the flues of gas-heated domestic boilers and similar apparatus. It is common in these and other flues for the outer end of the waste-gas passage to communicate with a passage which is open at both ends to the atmosphere; the intention being to ensure an unimpeded outflow of waste gases independently of the direction of air flow in the other passage. A sudden change of direction of air flow, however, may produce a back flow in the discharge pipe, and not infrequently causes extinction or lighting-back of the burner.



A Modified Flue Connection.

The object of the present invention is to avoid this in a very simple manner—by means of an extension from one side of the waste-gas passage into the air passage, so as to ensure under all conditions a region of relatively low pressure and high air velocity in the flue.

The vertical section which we reproduce shows the connecting piece in which the above is incorporated; the extensions or lips being seen protruding into the air passage and forming a constriction. Virtually the extension is such as would be obtained if the gas outlet passage were continued into the air passage and its end cut off obliquely, leaving the maximum of extension at the upper side. By this device a down draught in the air passage does not affect the out-flow in the waste-gas passage, and the troublesome effects sometimes produced are entirely avoided. The connection piece may be constricted in diameter at a position slightly above the waste gas passage.

Dyes from N-Substituted Carbazoles.—No. 201,625.

GALBRAITH, W. L., LEWCOCK, W., and TALLANTYRE, S. B., all of Beckton, E. 16.

No. 12,312; May 2, 1922.

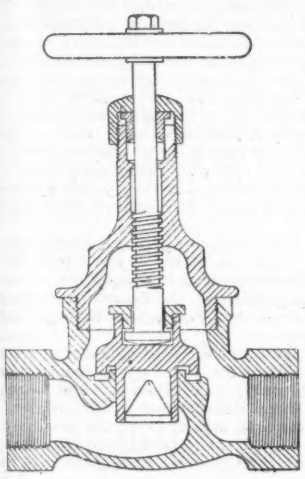
This patent covers a process, similar to that described in specification No. 201,624 (*supra*), for the manufacture of dyes derived from halogen-free nitrosophenols and N-substituted carbazoles (such as N-ethylcarbazole). The method is a modification of that described in specification No. 9689 of 1909.

Valves.—No. 201,800.

GRAINGER, J. E., of Golders Green, N.W. 1., DIXON, W. G., of Bolton, and SHADBOLT, S. M., of Manor Lane, S.E

No. 27,123; Oct. 7, 1922.

This invention presents a modification of the valve described in specification No. 193,127. Reference to our extract on p. 771 of Vol. CXLI. will show that the valve comprises a lift closure member combined with a second closure member of tubular form to vary the cross-sectional area of flow at a rate which is equal to, or substantially equal to, a function of the square of the displacement of the valve.



The Improved "Vee-Reg" Valve.

Where the second closure member has a V-shaped opening or its equivalent, the rate of increase of cross-sectional area open to flow through it is a function of the tangent of the angle of the V and of the square of the perpendicular from apex to base—that is to say, of the displacement of the valve; whereas in the case of valves having a rectangular opening the rate of increase of cross-sectional area open to flow is proportional to the displacement of the valve, which at small openings does not allow of a sufficiently delicate control. The invention also applies to valves in which the second closure member has a notch or opening of U shape, or a plurality of holes or openings equivalent to a V opening.

It will be seen from the illustration herewith that, according to the present invention, the apex of the V opening or its equivalent lies below the level of the face of the lift valve, and between the seating of the lift valve and the V-notched or equivalent valve an upstanding protective flange is arranged; these two features in combination preventing wire-cutting of the face of the valve.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 29.]

Nos. 21,023 to 21,574.

DAVIES, W. E.—"Carbonization, &c., of fuels." No. 21,369.
DVORKOVITZ, P.—"Manufacture of water gas." No. 21,082.
HARVEY, W. H.—"Incandescent burners." No. 21,033.
NEATH, J.—See Davies, W. E. No. 21,369.
PICCARD, A.—"Continuous analysis of mixed gases." No. 21,289.
RÜHR, A.—"Apparatus for distillation of coal." No. 21,100.
SMITH, E. W.—"Prepayment gas-meters." No. 21,548.
SMITH METERS, LTD.—See Smith, E. W. No. 21,548.
WEYMAN, J. E.—"Atmospheric gas-burners." No. 21,341.

At a special meeting of the Littlehampton Council held recently it was decided to terminate the contract with the Gas Company, and enter into an agreement with the Sussex Electricity Supply Company for the lighting of the town for the next ten years.

The employees of the Sutherland Meter Company, Ltd., Witton, Birmingham, held their annual picnic a week last Saturday, when a most enjoyable day was spent at Upton-on-Severn. The journey was made by train and boat; and they were entertained to dinner at the "White Lion" Hotel by the Directors of the Company. Afterwards a highly successful sports programme was carried out.

Members of the Blackburn Rotary Club paid a visit to the Blackburn gas-works on Aug. 29, escorted by Councillor E. Hamer, J.P. (Chairman of the Gas Committee), and Mr. Mitchell (the Gas Engineer). The party were impressed by the vast improvements made by the introduction of the new vertical retorts. Extensions in progress afforded an interesting glimpse of the method of construction employed in the retorts and combustion chambers. The bye-products were not the least interesting item; and the plant for extracting ammonia and producing sulphate was fully explained.

Last Saturday the annual sports of the Brighton and Hove Gas Company's Fire Brigade were held in the recreation grounds at the works at Portslade. In place of the old time individual competitions for medals in connection with fire-brigade work, the event was more in the nature of athletic sports. It may be mentioned that the excellent recreation ground of the Company, which is utilized for all manner of sport—from the vigorous pursuit of football to the gentler art of bowls—is now provided with an excellent grand stand and other seating accommodation. The prizes were distributed by Mr. Carey, Deputy Chairman of the Directors.

MISCELLANEOUS NEWS.

NATIONAL GAS EXHIBITION NOTES.

Additional List of Exhibitors.

[Supplementing those given on Aug. 8, p. 486.]

Alder and Mackay, Ltd., New Grange Works, Edinburgh.
Banning, G. H., No. 33, Hurst Street, Birmingham.
Beakbane, H., The Tannery, Stourport.
Birmingham Chamber of Commerce (Inc.), New Street, Birmingham.
British, Foreign, and Colonial Automatic Light Controlling Company, Ltd., No. 103, Holdenhurst Road, Bournemouth.
Etna Lighting and Heating Company, Ltd., No. 291, Broad Street, Birmingham.
Eveson, G. J., Coal and Coke Company, Ltd., No. 134, Edmund Street, Birmingham.
Fitchetts, Ltd., Nos. 137-139, Pershore Street, Birmingham.
Foster and Pullen, Ltd., Avil Works, Crossley Hall, Bradford.
Jeavons, E. E., & Co., Ltd., Church Lane, Tipton, Staffs.
Keith, Blackman, & Co., Ltd., No. 27, Farringdon Avenue, E.C. 4.
Kent, George, Ltd., No. 199, High Holborn, W.C. 1.
Lighting Trades, Ltd., Nos. 51-55, Garratt Lane, Wandsworth, S.W. 18.
Meltham Silica Firebrick Company, Ltd., Meltham, near Huddersfield.
Pass, E., & Co., Station Works, Denton, Lancs.
Podmore, E. A., & Co., No. 34, Charles Street, Hatton Garden, E.C. 1.
Procter, E. W., Triton Works, Britannia Road, Slaithwaite.
Robinson, J. H. (Liverpool), Ltd., Mill Lane, Old Swan, Liverpool.
Sigma Instrument Company, Pixmore Avenue, Letchworth, Herts.
Waller, G., and Son, Ltd., Phœnix Iron Works, Stroud, Glos.
Wallwin Company, Saltisford Iron Works, Warwick.
Wimbush, A. D., and Son, Little Green Lane, Small Heath, Birmingham.
Winston, T., No. 82, Ryland Street, Edgbaston, Birmingham.

Supporting Gas Undertakings.

In the "JOURNAL" for Aug. 22, p. 585, was given a list of supporting undertakings, sent to us by Mr. R. J. Rogers, the Hon. Secretary of the Exhibition. The following is a supplementary list.

Bath.	Plymouth and Stonehouse.
Bilston.	Portsea Island.
British Gas Light.	Salford.
Chapel Whaley and District.	Stockport.
Chichester.	Tipton.
Eckington and Mosboro.	Tottenham District Light, Heat, and Power.
Glastonbury.	
Knowle.	Wakefield.
Llandrindod Wells.	Willenhall.
Newcastle-on-Tyne & Gateshead.	Winchester.

Lancashire District (Manchester Section) Gas Salesmen's Circle.

The members of the above Circle attending the Special Meeting at the National Gas Exhibition, Bingley Hall, Birmingham, on Saturday, Sept. 22, are requested to assemble at the booking office of the London Road Station, Manchester, at 9.30 on this date.

The following arrangements have been made:

(1) Train leaves Manchester at 10 a.m., and arrives Birmingham 12.20 p.m. Returning from Birmingham 5.50 p.m., arrives in Manchester 8.13 p.m. Those who travel by this train may do so at a reduced (one day) fare—viz., 10s. 5d. return.
(2) Week-end tickets are issued from Manchester at single fare and a third—viz., 14s. for return journey on Sunday or Monday.

A. GILSON, Hon. Secretary.

[Other notes referring to the Exhibition will be found on p. 676.]

Welsbach Representatives' Factory Visit and River Trip.

Representatives of the Welsbach Light Company, Ltd., were concerned in two interesting events last week—the first being a tour of the Company's mantle factory, and the second a trip on the River Thames. On Friday afternoon, the whole of the representatives, depot managers, and departmental managers of the Company were taken by motor-cars from the head office to the Company's gas-mantle factory at Broombill Road, Wandsworth. The afternoon was spent in a complete tour of the factory, where the twenty-two processes through which the Welsbach gas-mantles are passed was demonstrated. The visit proved highly successful, and undoubtedly will be of great benefit to the representatives and staff whose duty it is to promote sales. The visit was terminated by a high tea at the factory, after which the party returned to the head office. The annual outing of the Company's head office staff, representatives, and depot managers took place on Saturday last. The party left Paddington by the 9.18 train to Windsor, where they boarded the new river steamer "Windsor Castle," and proceeded through magnificent scenery to Marlow, where one hour and a half was spent on shore, after which the party returned to Windsor, and finally arrived back in London at 10 p.m. Luncheon and tea were served on board. Every detail of the day's pleasure was excellently arranged, and the party thoroughly enjoyed the trip.

The Accrington District Gas Board's reconstructed gas-works at Great Harwood are to be formally opened at noon on Wednesday, Sept. 12. Following the opening the guests are to be entertained to luncheon at Mercer Hall, Great Harwood, by Messrs. Robert Dempster & Sons, Ltd.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Alton Gas and Coke Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4d. per therm.

Market Drayton Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 8s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 2s. per therm.

Syston and Thurmaston Gas Light and Coke Company, Ltd.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. 4d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 5d. per therm.

Prepayment-meter clauses are included.

Wath, Bolton, and Thurnscoe Gas Board.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 2d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 2d. per therm.

Prepayment-meter clauses are included.

DECLARATIONS OF CALORIFIC VALUE.

Borough of Appleby.—500 B.Th.U. (Aug. 1.)
Bourne Urban District Council.—500 B.Th.U. (Oct. 1.)
Bungay Gas Light and Coke Company.—360 B.Th.U. (Oct. 1.)
Chester United Gas Company.—475 B.Th.U. (Dec. 15.)
Corsham Gas Company, Ltd.—500 B.Th.U. (Sept. 1.)
Flint Gas and Water Company, Ltd.—500 B.Th.U. (Sept. 1.)
Holyhead and North Wales Gas and Water Corporation, Ltd.—425 B.Th.U. (Aug. 31.) This applies to the Llangefni, Llanrwst, Menai Bridge, Pwllheli, and Holyhead undertakings. Llanfairfechan undertaking.—475 B.Th.U. (Aug. 31.) Penmaenmawr undertaking.—450 B.Th.U. (Aug. 31.)
Lampeter, Llandyssul, Tregaron, and Aberayron Gas Company.—600 B.Th.U. (Aug. 31.)
Rothwell (Northampton) Urban District Council.—500 B.Th.U. (Oct. 1.)
Shipley Urban District Council.—500 B.Th.U. (Sept. 1.)
Thirsk Gas Company.—480 B.Th.U. (Aug. 31.)

GAS REGULATION ACT ORDERS.

There have been forwarded by the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Honley Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 13d. per therm. (Aug. 27.)

Llanidloes Gas, Coal, and Coke Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18·4d. per therm; and this price shall be substituted for the price of 5s. 5d. per 1000 c.ft. wherever it is mentioned in section 18 (price of gas) of the Llanidloes Gas Order, 1910.

After the declared date the word "therm" shall be substituted for the words "1000 c.ft." in paragraph (2) of Schedule B to the Llanidloes Gas Order, 1910; and the words "fifth of a penny" shall be substituted for the word "penny" wherever it occurs in that paragraph. (Aug. 29.)

Difficulties at Berlin Gas-Works.—In the London papers last week was a statement to the effect that either a suspension or at least a considerable restriction of the activities of the Berlin municipal undertakings was feared. Large firms and groups of private consumers of gas are in active disagreement with the financial policy in fixing prices for gas and electricity. They are refusing to pay their bills, with the result that it is impossible for the municipality to purchase coal or pay the workmen's wages.

Reduction at Ipswich.—The Directors of the Ipswich Gas Company have announced a further reduction of two-fifths of a penny per therm in the price of gas. This will take effect from the September quarter reading of the meters. The new price will be 9⅜d. per therm (equivalent to 3s. 7½d. per 1000 c.ft.). The rates at which prepayment meters are set will not be altered; but these consumers will receive the reduction in the form of an increased cash rebate, which will be four-fifths of a penny per therm from Oct. 1.

The Sir John Cass Technical Institute.—We are informed that the 1923-4 session of this Institute (the address of which is Jewry Street, Aldgate, E.C. 3) will commence on Thursday, Sept. 20. Students will be enrolled on Monday, Tuesday, and Wednesday, Sept. 17, 18, and 19, from 6 to 8.30. The courses of instruction, which are held from 6 to 10 o'clock, meet the requirements of those engaged in the chemical, metallurgical, electrical, petroleum, and the fermentation industries. Full facilities for special investigations and research are provided in the well-equipped laboratories of the Institute. The instruction in experimental science also provides systematic courses for the examinations of the London University, the City and Guilds of London Institute, and the Institutes of Physics, Chemistry, and Brewing. Special courses of higher technological instruction form a distinctive feature of the work of the Institute; and included in the courses for the forthcoming session are those of petroleum technology, metallography and pyrometry, heat treatment, and foundry practice—to mention only a few of the subjects comprising the syllabus.

TORQUAY AND PAIGNTON GAS COMPANY.

The first general meeting of the Torquay and Paignton Gas Company since the amalgamation of the two Companies was held last Thursday—Major R. P. KITSON presiding.

The CHAIRMAN expressed the opinion that the amalgamation would benefit consumers, as the increased production of the single Company would tend to reduce the price of gas. It would also benefit the shareholders, because their holdings would be more stable, and have a freer and more extended market. The Board considered that service was the best advertisement for the sale of gas; and their first aim was to supply gas of the highest quality at a reasonable price. When consumers were comparing prices, they could only adopt a fair comparison by bringing into calculation the calorific value of the gas. It had already been intimated to the shareholders that the present holdings of shares would be converted into two classes of stock—preference stock, bearing a maximum dividend of 5 p.ct., and ordinary stock bearing a maximum dividend of 6 p.ct. Various mortgages had been created from time to time, and it was thought desirable to consolidate the liability under that head and pay one uniform rate of interest. To provide for these liabilities, and also for the general purposes of the Company's undertaking, the Directors asked for authority to raise from time to time the sum of £30,000 by the issue of debenture stock. General purposes included the contemplated alteration at the works in regard to the retorts. The Company had been working since its formation on horizontal retorts, but owing to continued increase in the make of gas it was necessary to extend the existing retorts. The Directors had under consideration the possibility of adopting vertical retorts. It was proposed to carry out new works at an early date.

A resolution empowering the Directors to raise the £30,000 was proposed by the CHAIRMAN, seconded by Mr. H. B. ROSSITER, and carried unanimously.

The CHAIRMAN welcomed the three Directors and the shareholders from the Paignton Company. Under the terms of the Order, Mr. Beynon retired from his position as Manager and Engineer of the Company, and had been appointed a member of the Board. Reference was also made to the appointment of Mr. Dawson as Manager and Engineer of the enlarged Company.

Mr. T. J. CROSSMAN proposed, and Mr. W. W. COX seconded, the election of the following Directors: Mr. R. Beynon and Major Vickers; Messrs. H. Dundee Hooper, J. F. Rockbey and W. G. Couldrey; Major Kitson, and Messrs. Rossiter and G. H. Iredale.

The CHAIRMAN proposed that the total sum of Directors' remuneration be £900 per annum, the payment of tax to be made by each member, and the extra remuneration for the Chairman to be dealt with by the Directors.

This was agreed to; several shareholders remarking that compared with similar companies the sum was very reasonable.

Major KITSON expressed sorrow at the loss the Company had sustained by the death of Mr. William Aitken, one of the Directors. He did not think he would be saying too much if he said that Mr. Aitken lost his life in the service of the Company. A few weeks before he died he was a member of the Committee of the Board formed for the purpose of inspecting various works in different parts of the country, with a view to advising the Board as to the advisability of adopting certain methods in the manufacture of gas. He had returned from the inspection with a chill, which resulted in his death. He had served the Company faithfully and wisely.

Messrs. Wood, Drew, and Co. were appointed Auditors in accordance with the Order; the retiring Auditors (Mr. W. W. Cox and Mr. Eliot Thomas) being thanked on the proposition of Mr. H. Tuckett.

CHICHESTER GAS COMPANY.

The half-yearly meeting of the City of Chichester Gas Company was held on Aug. 28—Mr. W. A. Walker presiding. The Directors, in their report for the six months ended June 30, stated that the balance at credit of the profit and loss account amounted to £5488, out of which they recommended the declaration of dividends for the half-year at the rates of 10 p.ct. per annum on the "A" capital stock, and 7 p.ct. on the "B" and "C" capital stocks, all less income-tax. This would absorb £1567, leaving the balance to be carried forward for interest on the debenture stock and temporary loans.

In moving the adoption of the report and accounts, the Chairman said that, notwithstanding the fact that the prices of coal, materials, and labour were still from 80 to 100 p.ct. higher than in June, 1914, the Board found themselves in a position to recommend the payment of the maximum dividends. During the half-year, they had expended £205 on capital account. The balance remaining at the credit of this account stood at £1022. On revenue, the first and most important expenditure had been on coal and oil, which had cost £4403, as against £5019 for the corresponding half of last year. The reduction in cost was due to an abatement in prices, and an improvement in working; though if they made a comparison with June, 1914, when the cost was £2476, it would give the shareholders some idea of the difference in the times. The two items of purifying materials and salaries showed little difference. Wages for carbonizing, however, showed an abatement of £184, as arranged between the men's unions and the federated employers. The total wages paid amounted to £2437, compared with £1239 for the half-year ended June 30, 1914—an increase of 96·65 p.ct. Repairs and maintenance of works and plant had cost £1875, in comparison with £1440 in the corresponding half of last year. The amount spent on the maintenance and renewal of mains had been reduced by £254. The gas rentals amounted to £9998—a decrease of £1569, largely due to the fact that there had been three reductions in the price of gas during the past twelve months. On Oct. 1 next the price would be further reduced by 2½d. per 1000 c.ft. The reduced income from all sources amounted to £1181; and if the reduced expenditure of £1081 was taken into account, the difference—viz., £800—represented the variation in profit between this and the corresponding half of last year. The number of ordinary consumers was 812, and prepayment

consumers 1865—a total of 2677, compared with 2636 a year ago. The number of stoves out on hire was 2504, a gain of 50 on the year. The Chairman concluded with an expression of thanks to the Engineer (Mr. Ritson) and the Secretary (Mr. Vick) for so successfully carrying out their respective duties during the half-year.

Mr. Cash, in seconding, said there was no doubt their future depended upon three things—coal, labour, and materials. The cost of materials would decrease to a certain extent, and automatically there would be a further reduction in the price of gas. Cheap gas helped consumption, and increased consumption reduced cost of production.

The report and accounts were adopted, and the dividends recommended were declared.

TRADE NOTES.

Aluminium Sections.

From the British Aluminium Company, Ltd., of No. 109, Queen Victoria Street, E.C. 4, we have received a calendar which serves from this month to September, 1924. This contains much useful information respecting aluminium sections and sheets, together with tables of sizes and weights. The Company always turn out well-prepared literature concerning their products; and this is no exception.

Horstmann Gas Controllers and Burners.

At the National Gas Exhibition, Bingley Hall, Birmingham (Sept. 17 to Oct. 3), the Horstmann Gear Company, Ltd., will exhibit at stand No. 28 their range of gas controllers for automatic lighting. Superheated burners will also be demonstrated. We are informed that the Company have a limited number of invitation tickets placed at their disposal; and they will be pleased to forward one to any interested reader who will visit the exhibition.

New Holders for Birmingham.

Messrs. Clayton, Son, & Co. have been successful in obtaining a contract from the Birmingham Corporation for two large holders of the frame-guided type. This order is one of the largest of its kind to be placed recently. The firm are in the happy position of having their workmen on full time—a state of affairs which, unfortunately, is very rare at present in engineering centres. Another job which is in hand is the construction of twelve oil storage tanks for abroad. These have a capacity approaching three million gallons, and weigh 250 tons.

Simon-Carvés' Bye-Product Plant.

Orders have been received by Messrs. Simon-Carvés, Ltd., of Manchester, from the Wigan Coal and Iron Company, Ltd., for the reconditioning of their bye-product plant, comprising the supply and erection of new gas-cooling, exhausting, and benzole scrubbing plant, and plant for the manufacture of sulphate of ammonia and benzole. The work is in connection with the large installation of bye-product coke-ovens at their iron and steel works. Messrs. Simon-Carvés have also received an order from the Wharncliffe Silkstone Colliery Company, Ltd., for the extension and reconditioning of the bye-product plant in connection with the coke-ovens at their colliery.

"Pict" Refractories.

We have received from the Scotswood Furnace Company, of Scotswood-on-Tyne (London Office—Adams' House, No. 23, Old Queen Street, Westminster, S.W. 1), details of their refractory materials. The "Pict" base clay is a natural highly-aluminous fireclay known as the Ayrshire bauxitic clay, estimated to contain nearly 16 p.ct. of free alumina, and an alkali content which does not exceed 1 p.ct. The full analysis of the base clay is as follows: SiO_2, 42·36 p.ct.; Al_2O_3, 52·48 p.ct.; Fe_2O_3 1·16 p.ct.; CaO and MgO, trace; K_2O, 0·34; Na_2O, 0·35; and $Ti\,O_2$, 3·31. Type "A" firebrick, we are informed, is capable of withstanding a temperature of 1800° C. for a prolonged period. These bricks are specially recommended for excessive temperatures. Type "D" has been introduced for furnace work where the temperature is not so high, but where a lower porosity is desirable to resist corrosion and abrasion. The same basic material is used, combined with others of lower cost. This type is suitable for gas-works, coke-oven plant, &c.

Wolverhampton Gas Company.—At the half-yearly meeting of the Company last week, it was decided to make a special donation of £300 to the Wolverhampton General Hospital Special Appeal Fund. On the recommendation of the Directors, the shareholders also decided to contribute £200 towards the provision and equipment of a new pavilion for the employees' sports club, and to grant an annual subscription of £50 to the funds of this club. Supporting the proposition, Mr. Harold Lee said he thought this kind of action was calculated to cement good feeling between directors and workmen; and he was glad to see the movement spreading throughout the country.

Woking District Gas Company.—The ordinary general meeting of the Company was held on Monday last, when the Directors submitted their report and statement of accounts for the half-year ended June 30. The receipts from gas showed a decrease of 8·24 p.ct. as compared with the corresponding period of 1922, and sales from residuals an increase of 37·92 p.ct. The revenue for the half-year was £23,869, and the expenses on revenue account (after charging £2000 to renewal fund account) amounted to £18,987, leaving a profit of £4881, to which was added the balance of £1424 from the last account. After making the usual charges for interest, &c., there remained an available balance of £4981, out of which sum the Directors recommended the declaration of dividends at the following rates: On the "A" and "B" ordinary stocks, 6 p.ct. per annum, on the "C" preference and the 5 p.ct. redeemable preference, 5 p.ct., and on the 8 p.ct. redeemable preference, 8 p.ct. These dividends absorbed £2297, leaving a balance of £2684 to be carried forward. It has been decided to reduce the price of gas by 1d. per therm (equivalent to 4½d. per 1000 c.ft.) to all consumers, as from Michaelmas next.

Salisbury Gas Company.

At the recent annual general meeting of the Company, Mr. Charles Haskins (Chairman), in moving the adoption of the report, the financial statement, and the payment of the full statutory dividends for the year ended June 30, mentioned that there had been no capital expenditure during the year. The overdraft of £27,737 had been reduced to £9308 (partly by the issue of £10,000 of new capital), and it was hoped that before the next meeting the overdraft would be entirely paid off. In the revenue account, the cost of manufacture amounted to £35,275. This was £5213 less than the previous year. Coal had cost less by £7184. Wages were the same as in the two preceding years. The cost of distribution (£7980) was £590 more; but mains had been extended to Quidhampton and West Harnham. The total expenditure was £48,098, compared with £52,791. On the credit side, gas, with rentals for meters, stoves, and lamps, realized £41,209, which sum was £1356 less than that of the previous year. This was accounted for by the two reductions in the price of gas made during the year. Residual products brought in £12,951, as against £16,748. The total receipts from all sources were £54,162, or £5159 less than last year, and the balance carried to profit and loss account, £6066, was rather more than sufficient to meet the full year's dividend and bank interest. In the general balance-sheet the reserve fund stood at £6558. It was a great satisfaction to the Directors that they were able to present such a good report, for which they were indebted to the able management of Mr. Fielden, whose services to the Company were more highly appreciated each year.

Growth of the Smethwick Gas Undertaking.

A Ministry of Health Inquiry was conducted at Smethwick last week by Dr. A. W. Brightmore into the application of the Smethwick Corporation for sanction to borrow the sum of £174,794 for the purposes of gas undertaking extensions. Explaining the circumstances which led the Corporation to embark on the scheme, Mr. Leonard Worden (Deputy Town Clerk) said the existing plant was inadequate for the economic working of the undertaking. During the war a great strain was experienced owing to demands for larger quantities of gas required for the manufacture of naval and military equipment. Not only was it difficult to cope with these demands, but it was impossible to carry out the necessary renewals and repairs to the existing plant. Mr. Worden pointed out that in 1882, when the undertaking was commenced, the output of gas was 123 million c.ft., whereas in the prosperous year of 1921 the output had increased to 695 millions. During the present year it was estimated that it would have increased to 720 millions. In anticipation of these extension schemes, the Corporation had obtained an Order for larger borrowing powers; and it was under this Order that the present application was being made. It was a matter of extreme urgency that the extensions should be completed with as little delay as possible, owing to the increasing demands. The application also had a bearing upon the unemployment question, as the Unemployment Grants Committee had notified their willingness to consider making a grant in respect of £129,126. Owing to the urgency of the matter, the Corporation had been compelled to put part of the scheme into operation; and £9587 had already been expended towards the erection of the new purifiers. Mr. Hardiker (the Gas Engineer) expressed the opinion that the consumption of gas during the next ten years was likely to increase at a much more rapid rate, owing to the opening of new industries in the neighbourhood. One large consumer alone, who had moved into the district from Birmingham, was already taking 112,000,000 c.ft. per annum; and it was anticipated that requirements would grow to 150,000,000 c.ft. yearly. At the conclusion of the inquiry, the Inspector visited the gas-works.

Barnsley Gas Company.

At the annual meeting of the Barnsley Gas Company on Thursday last, the Chairman (Mr. E. G. Lancaster), in proposing the adoption of the annual report, strongly defended the policy of the Directors in regard to prices, and replied to some recent criticism by the Barnsley Chamber of Commerce and large local consumers. Alluding to the criticism of the local Chamber of Commerce, Mr. Lancaster said this body had of late taken a considerable interest in the affairs of the Gas Company. The Secretary had written to the Company complaining that the price of gas was too high. The Gas Company had replied that, taken on the pre-war basis, their present price compared favourably with those of adjoining towns. The Chamber of Commerce had then obtained figures from about a dozen towns; and in spite of further information were still dissatisfied. A meeting of consumers was called with the object, he presumed, of stirring up further agitation. They did not intend to give bigger discount than 25 p.ct. to a few large consumers; and any further reduction in price would be to the advantage of their 15,060 consumers. No part would go to bolster up the profits. There had been much comment on the Company's 10 p.ct. dividends; but he wished to point out that their maximum dividend was £8400 on a capital of £100,000. This was less than 8½ p.ct. When they deducted income-tax, it left 6½ p.ct.—a rate which everyone would admit was very small for a trading concern. Mr. Lancaster then quoted figures of other concerns, to justify the Company's present prices, and said they were being pressed to reduce the price of gas at a time when every expense was piled up on them. The cost of straightening-up the streets after the relaying of mains had been a very heavy extra expense during the year; and this exceeded £1000. Extra charges and legal costs worked out at about 5d. per 1000 c.ft., which should have gone to the relief of the consumers. All the Company required to carry on the concern was a profit of 1s. per 1000 c.ft. Anything over and above this would go to consumers. The bigger the profits, the sooner would the Company be able to give consumers the benefits of a reduction. He was pleased to see that the Corporation were now adopting a more friendly spirit towards them. The report and accounts were approved.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Further cheerfulness has characterized the coal market this week. There has been sufficient business to put collieries generally in a much better position for prompt, and the inquiry for forward has caused them to feel much more optimistic about the future. At the time of writing, the outcome of the anthracite miners' strike threat still seems to be in doubt. But the threat itself, and the possibility of the bituminous miners joining in sympathetically, have caused Continental buyers to cover for their early requirements. At the same time, the better-class gas collieries, and indeed any that are nominally well sold-up to the end of the year, are holding their available balances, and refusing to quote beyond the end of September.

Altogether, there has been a feeling that many buyers are afraid the bottom of the market has been reached; and from the large amount of inquiry that has come along, it appears that they are more anxious to get fixed up on the basis of recent low quotations than collieries are to sell. Indeed, the latter do not seem in any hurry to fix up for next year, though a certain amount of good gas coal has been sold for them at prices between 23s. and 24s. Best gas for prompt is about 23s. 6d. to 24s. 6d. f.o.b. direct, and good seconds 22s. to 22s. 6d., though second-hand holders in some cases have quantities which they might clear at slight reductions on this. For the rest of the year, collieries are rather inclined to hold their available balances, on the chance of the market hardening still further.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There seems to be a little better tone in the Yorkshire and Lancashire coal market at the present time, which, however, has had no effect so far on prices. Local industrial concerns report a more optimistic outlook in view of the attempts to settle the nearer Continental situation, the success of which would result in improved export trade. With the cooler weather there has been a little better demand in the house-coal section, and more inquiry for export, without any large volume of business being done.

In Lancashire, the cotton-trade demand does not revive.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The market is congested, for absorptive capacity has decreased out of proportion to the reduction of output. With the non-fulfilment of calculations as to recovery of the export demand, collieries have on their hands considerable tonnages raised in anticipation of shipment. There would be no difficulty in expanding the trade if shippers chose to take risks. They want to make sure of payment, however, before they put through the business offering from Germany and perhaps other quarters of the Continent; and this is the limiting factor rather than a declining demand. Collieries that want to liquidate their stocks on the home market can only do so by making price concessions. The stability of values is, however, not seriously disturbed.

So far as the arrested deliveries of gas coal are concerned, the situation is expected to right itself in a very short time, though the consumption of gas for industrial power and heating gives no indication of a stimulus.

Price concessions offered on specified qualities of household coal, as an encouragement to summer stocking, have been withdrawn this month. In exceptional cases the difference amounts to as much as 3s.; the average being about 1s. per ton. With the abatement of the export trade in slacks there has been some accumulation of stocks; but the disparity is now being corrected. Small nuts and beans are in plentiful supply.

Furnace cokes are in small request, more smelting plants having gone out of commission in South Staffordshire.

Customer Ownership of Stocks and Shares.

The value of customer ownership of stocks and shares is emphasized by the Financial Editor of the "New York Times," who says that the advocates of the plan adopted by many public utility corporations of distributing their stock among consumers on the part-payment system appear to have secured a powerful argument in favour of this method during the recent period of declining stock values. They are able to point to the fact that the public utility stocks marketed on this basis have declined proportionately less than any other group, mainly because they have been held outright by such a large number of persons. It is indicated in this connection that most of this stock is purchased for investment; and it therefore means little to the average stockholder whose name is on the books of the undertaking, and who receives his dividend warrants, whether the shares decline or advance in the open market, because he has no intention of selling, even at a figure that would net a good profit. The "Boston News Bureau" also remarks that some great utility undertakings are nowadays selling preferred stock over their own counters to their customers, and taking payment on the instalment plan. Customer ownership promotes goodwill and the spirit of co-operation between the utility company and the public they serve. It helps both parties to realize their essential unity of interest, diffuses among a community a knowledge of the problems of the business, and tends to check the political agitator in putting over his fallacies and to expose the weaknesses of public ownership.

In reviewing the salient features of the past half-year's working of the Eastbourne Gas Company at a recent meeting, Mr. F. H. Jones (Deputy Chairman) mentioned that the number of consumers, 12,666, was greater than at the end of December last.

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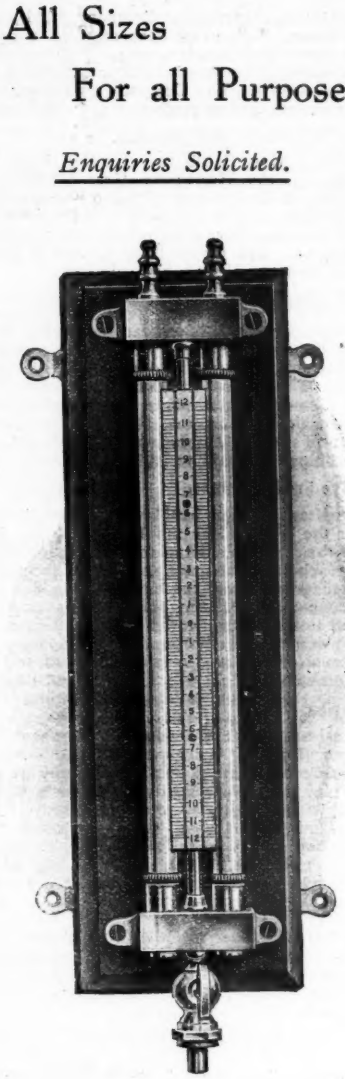

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 3.

The market for pitch is quiet; but makers' idea of values remains steady at not below 150s. per ton at works. Creosote is in demand, and the price is firm at from 10d. to 10¼d. per gallon. Pyridine is a strong market at about 19s. per gallon. Solvent naphtha is quiet, and practically no business is offering. Pure benzole is from 1s. 8d. to 1s. 9d. per gallon, and pure toluole from 2s. to 2s. 3d. per gallon. Other products are without material change.

Tar Products in the Provinces.

Sept. 3.

The average values for gas-works products during last week were: Gas-works coal tar, 80s. to 85s. Pitch, East Coast, 135s. to 140s. f.o.b. West Coast—Manchester, 132s. 6d. to 137s. 6d.; Liverpool, 133s. 6d. to 138s. 6d.; Clyde, 133s. 6d. to 138s. 6d. Benzole 90 p.ct., North, 1s. 2½d. to 1s. 3½d.; crude 65 p.ct. at 120° C., 10d. to 10½d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

A Welsbach Cinema Film.—On the occasion of the recent visit of the King and Queen to Wandsworth, it may be remembered that the Welsbach Light Company (whose mantle factory overlooks the new King George Park at Earlsfield, which was officially opened by their Majesties) erected a stand on the grounds adjoining their premises, to accommodate their staff and workpeople. Realizing that the unique occasion warranted more than passing attention, the Company arranged for a film to be taken. This turned out extremely successful; and last week an exhibition of the film was given at the private theatre at Beck House, Shaftesbury Avenue, W. 1, when the principal members of the staff of the Welsbach Company, both from the head office and the mantle factory, together with representatives and depot managers, had an opportunity of seeing the animated picture of the Company's welcome to the Royal visitors. Other features of the film were a general view of the factory building and some interesting studies of the Works Manager (Mr. B. Bark), the General Manager (Mr. H. Talbot), and the Chairman of the Company, Mr. J. R. Yates.

Cork Gas Consumers' Company.—The half-yearly meeting of the Company was held last week, when a dividend at the rate of 8 p.ct. per annum was declared, as compared with 6 p.ct. for the previous half-year. After placing £1120 to the credit of depreciation fund, the balance of profit and loss was £4386.

Fire at the South Shields Gas Offices.—An outbreak of fire occurred last week at the offices of the South Shields Gas Company, in Chapter Row, South Shields. The fire brigade were able to extinguish the flames after 40 minutes' work. It appeared that the outbreak had occurred at the fireplace; and the joists under the floor had been smouldering for hours after the staff had left the office. The floor was in a blaze when the firemen arrived, and danger was increased by the fact that the heat had melted the gas-pipe. The floor was extensively damaged.

Eastbourne Gas Company.—At the general meeting on Aug. 27, Mr. F. H. Jones (Deputy Chairman of the Company) moved that the draft of a Special Order proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, 1920, on the application of the Company, be approved. The object of this was to obtain powers to supply a bigger area, to raise additional capital, and to use land purchased for gas-works. The Order would also provide for a yearly meeting of the shareholders instead of the two half-yearly meetings; but this, it was explained, would not prevent the Directors declaring an interim dividend. The motion was carried. Mr. J. S. Garrard (Secretary) attributed a good deal of the success they had achieved during the half-year to the popularity of the co-partnership scheme which they had resuscitated, and also to the wise policy of the Directors in introducing up-to-date plant. He spoke of the remarkable amount of business being done, and the number of inquiries made for new appliances. He thought the time would come when no coal would be used in the town.

Irish Gas Company's Winding-Up.—On the transfer from the Southern Ireland Chancery Division to the Northern Ireland Courts of the matter of the Dromore (Co. Down) Gas Company which arose on winding-up proceedings, it was explained by Counsel acting for the executors and trustees of the late Mr. Thos. Duncan, of St. Vincent Street, Glasgow, coal merchant, who was a creditor to the extent of £611, that, at a meeting of creditors in Belfast, an offer was made of 10s. in the pound, payable in cash within three weeks as from November, 1921. Mr. Duncan and other creditors accepted this; but the Company had not carried out the arrangement. The order for winding-up was made in December, 1921; but applications to have the winding-up continued had been unsuccessful. It was the desire of the late Mr. Duncan's representatives that Mr. Sydney Herbert Jackson, of Donegal Place, Belfast, should be appointed liquidator. Owing to a provision of the Government of Ireland Act, 1920, the proceedings could not be continued in the Irish Free State, as the property of the Company consisted of land in Northern Ireland.

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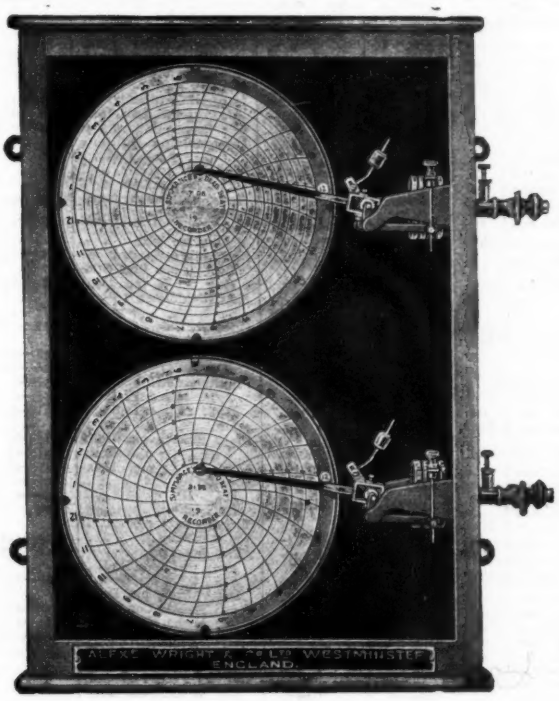

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STOCK MARKET REPORT.

THE Stock Exchange has had a most satisfactory week on the whole. Business at once showed an improvement in volume and increased strength in important lines. Gilt-edged descriptions were prominent in this respect. Home Government issues and Indian and Colonial dittos were very strong. Home Rails were in good demand, and Canadians rose. The Foreign Market showed many advantages —*e.g.*, French, Russian, Turkish, and Chinese; but there were some weak spots before the close. In the Miscellaneous Market, Rubber and Oils effected a smart rally.

Business in the Gas Market showed little, if any, increase in activity, and prices were almost entirely unchanged. It is fair to hope that, with the passing of August—the popular holiday month—interest and enterprise may rise.

The following transactions in gas were recorded during the week: On Monday, Alliance and Dublin 73¼, 74, Brentford "A" 103, ditto "B" 101½, 102, ditto 4 p.c. debenture 80, Commercial 4 p.c. 96, ditto 3½ p.c. 94½, Gas Light ordinary 96, 96⅜, 96½, 96⅝, 97, ditto 3½ p.c. maximum 66⅜, ditto 3 p.c. debenture 62½, Hongkong and China 15⅝, Imperial Continental 161¾, 162, Primitiva 6s., 6s. 10½d., ditto 5 p.c. preference 30s., South Metropolitan 98½, Swansea 7 p.c. preference 101½, Tottenham 4 p.c. debenture 78, Montevideo 5 p.c. 1st mortgage 74⅞. On Tuesday, Bombay 5⅜, 5 5/16, 5⅜, British 12, Commercial 4 p.c. 94½, 97, European 7½, Gas Light ordinary 96⅜, 96½, 97¼, ditto 4 p.c. preference 81, South Metropolitan 97⅜, 98⅜, ditto 6½ p.c. debenture 108½, Swansea 7 p.c. preference 102½, British "B" 11, Harrow and Stanmore 5 p.c. 100¾, Metropolitan of Melbourne shares 7 7/16. On Wednesday, Alliance and Dublin 73½, Bombay 5½, 5⅝, Brentford "B" 103, Cape Town 4½ p.c. debenture 73, Continental Union preference 76½, 76⅜, European 7½, Gas Light ordinary 96⅜, 97, ditto 3½ p.c. maximum 66, Imperial Continental 161, Lea Bridge 98, Primitiva 5 p.c. preference 30s., South Metropolitan 98, South Suburban 5 p.c. debenture 97½. On Thursday, Cardiff 7½ p.c. debenture 109⅜, European 7½, 7⅜, Gas Light ordinary 96½, 96⅝, 96⅞, 97, 97¼, 97⅜, ditto 4 p.c. preference 81, 82, 82½, ditto 3 p.c. debenture 62, Imperial Continental 3½ p.c. debenture 76, 77¼, Lea Bridge 99, Newcastle 82½, Southampton 90, 90½. Wandsworth Wimbledon 113, Southend 4 p.c. debenture 75, Southgate 7 p.c. maximum 105½. On Friday, Alliance and Dublin 4 p.c. debenture 67, Bournemouth "B" 12⅛, Brentford "A" 102½, 102⅜, 104, British 12 1/16, 12⅛, ditto "B" 11, Commercial 4 p.c. 95½, European 7 13/16, Gas Light ordinary 96⅝ 97⅛, 97¼, Imperial Continental 160½, Oriental 100½, Primitiva 5 p.c. preference 30s., South Metropolitan 97½, 98¼, South Suburban 101, 101¼, ditto 7 p.c. debenture 103, Tottenham "A" 122, ditto "B" 101, Wandsworth "B" 113½, Southend 4 p.c. debenture 78½.

In the Money Market, the position was almost a facsimile repetition of the previous week—to wit, alternations of demand and ease, which quickly succeeded each other. The demand appears always to have revealed supplies which effectually relieved all pressure. At the close of the week, the position was quite comfortable. Discount rates were easier. Silver hardly moved at all. The Bank of England rate is 4 p.c., as fixed on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
131,978	Stk.	Aug. 9	—	5%	Aldershot 5 p.c. max. C.	..	72—77	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	72—77	73¼—74
374,000	,,	July 12	4	4%	Do. 4 p.c. Deb.	76—79	62—67	67
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5⅜—6⅜	5⅜—5⅝	5⅜—5⅜
100,000	5	Aug. 9	16	8/6	Bournemouth Gas and Water { 5 p.c.	..	11⅝—12⅜	...
383,110	10	,,	7	7/-	B 7 p.c.	15—15½	11⅝—12⅜	12⅛
125,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	10⅞—11⅛	...
162,065	—	June 28	—	4%	4 p.c. Deb.	..	77—82	...
992,045	Stk.	July 12	14	61/-	Brentford A Consolid.	261—266	100—105	102½—104
734,920	,,	,,	11	61/3	Do. B New	204—209	100—105	101½—103
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	83—88	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	77—82	80
214,775	,,	Aug. 23	11	11½%	Brighton & Hove Orig.	208—213	171—176*	...
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	127—132*	...
1,272,500	Stk.	July 26	5	5%	Bristol 5 p.c. max.	..	94—95	...
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	12—13	12—12½
10,000	10	June 28	—	7/-	Do. 7 p.c. Pref.	..	11⅝—12½	...
120,000	Stk.	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	74—79	...
220,335	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	56—59	...
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1¾—2¼	6¾—7¼	...
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 28	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	70—75	75
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	106—111	109½
157,130	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 25	5/9/4	60/-	Commercial 4 p.c. Stk.	106—108	94—97	94½—97
560,000	,,	,,	5½	60/-	Do. 3½ p.c. do.	103—105	94—97	94½
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	58—62	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	35—40	...
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	72—77	76½—76⅝
660,000		Aug. 9	—	6½%	Croydon sliding scale.	..	101—104	...
284,975		,,	—	5%	Do. max. div.	..	81—85	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
209,000	,,	Apl. 5	—	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5/0	European, Ltd.	17½—18	7½—8½	7½—7 13/16
16,546,120	Stk.	July 26	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord.	98—102	96—98	96—97⅜
2,600,000	,,	,,	3½	35/-	3½ p.c. max.	76—79	65—68	66—66½
4,062,235	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	80—83	81—82½
4,761,930	,,	June 14	3	3%	3 p.c. Con. Deb.	72½—74½	60—63	62—62½
130,000	,,	Dec. 11	10	10%	10 p.c. Bonds	—	..	...
	—	—	—	—	7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Mar. 8	5	65/7½	Hastings & St. L. 5 p.c.	..	92—97	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	15—16	15⅝
86,600	Stk.	Aug. 23	9	9½%	Hornsey 7 p.c.	..	144—149*	...
1,976,000	,,	May 31	9	£17	Imperial Continental	150—160	158—163	160½—162
404,800	,,	Aug. 9	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	76—78	76—77½
235,242	,,	,,	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	98—99
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	—	..	...
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	106—109	...
165,736	,,	Aug. 23	7/5/6	90/-	Maidstone 5 p.c.	—	104—109*	...
63,480	,,	June 28	—	3%	Do. 3 p.c. Deb	..	52—57	...
75,000	5	June 14	6	3/6	Malta & Mediterranean	4⅛—4½	3¾—4	...
100,000	100	Apl. 5	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	97—100	...
541,920	Stk.	May 17	4	4%	Montevideo, Ltd.	11½—12	50—55	...
1,875,892	,,	July 26	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	84½—85½	84½
250,166	,,	Aug. 9	—	4%	Do. 4 p.c. Pref. Stk.	..	74½—76	...
529,705	,,	June 28	3½	3½%	Do. 3½ p.c. Deb.	82—83	72—73	...
15,000	10	—	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Aug. 23	7/14/0	7/8⅜	,, ,, 7 p.c.	14—15	11⅝—12½*	...
300,000	Stk.	May 3	8	8%	Oriental, Ltd.	117—122	97—102	100—100⅝
188,120	Stk.	June 28	—	78/9	Plym'th & Stonh'se 5 p.c.	..	106—110	...
60,000	50	Mar. 8	13	65/-	Portsea Island, B	128—131	103—108	...
100,000	50	,,	12	60/-	Do. C	118—121	100—105	...
290,069	5	—	8	—	Primitiva Ord.	5⅜—6	⅛—¼	6/—6/10½
499,960	5	—	5	—	Do. 5 p.c. Pref.	4⅝—5	1⅝—2	30/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	73—75	...
600,000	Stk.	July 26	4	4%	Do. ,, ,, 1911	..	56—59	...
346,198	,,	June 28	4	4%	River Plate 4 p.c. Deb.	85—87	56—59	...
150,000	10	Mar. 22	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5⅛—6⅛	...
125,000	50	July 2	5	5%	5 p.c. Deb.	47—49	38—41	...
135,000	Stk.	Aug. 23	10	5%	Sheffield A	223—224	102—104*	...
209,984	,,	,,	10	5%	Do. B	222—224	101—103*	...
52:,500	,,	,,	10	5%	Do. C	220—222	101—103*	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	May 31	9	9/-	South African	10½—11½	7½—9½	...
6,609,895	Stk.	July 26	5/4/0	50/-	South Met. Ord.	111—113	96—99	97½—98½
250,000	,,	July 12	—	5%	Do. Red. Pref.	..	98—100	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—63	...
734,000	,,	Mar. 8	—	6½%	Do. 6½ p.c. Deb.	..	107—109	108½
91,500	,,	Aug. 23	8½	4½%	South Shields Con. Stk.	157—159	126—128*	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	100—103*	...
368,837	,,	June 28	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	97½
647,740	,,	May 3	5	7%	S'th'mpt'n Ord. 5p.c. max.	99—102	88—91	90—90½
121,275	,,	June 28	4	4%	Do. 4 p.c. Deb. Stk.	..	72—77	...
250,000	,,	Aug. 23	—	70/-	Swansea 7 p.c. Pref. Stk.	..	101½—102½*	101½—102½
200,000	,,	June 28	—	6½%	Do. 6½ p.c. Deb. Stk.	..	105—107	...
120,000	,,	July 26	—	8%	Tottenham { A 5 p.c.	135—138	120—125	122
782,275	,,	,,	6	6½%	District { B 3½ p.c.	115—117	100—105	101
181,255	,,	June 14	4	4%	4 p.c. Deb.	87—89	78—82	78
258,251	Stk.	Aug. 23	5	2½%	Tynemouth 5 p.c. max.	108½—109	88—90*	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 12	8½	90/-	Wandsworth A 5 p.c.	151—156	126—131	
255,636	,,	,,	6½	75/-	Do. B 3½ p.c.	129—134	112—117	113½
108,075	,,	,,	—	63/-	Do. C.	..	97—102	...
140,865	,,	,,	—	63/-	New Ordinary	..	97—102	
332,000	,,	,,	6½	71/3	Wimbledon 5 p.c.	117—122	109—114	113
98,000	,,	,,	6½	76/3	Epsom 5 p.c.	121—126	112—117	...
88,416	,,	June 28	3	3%	5 p.c Deb. Stk.	66—69	57—60	...

* Ex. div.

The North Middlesex Quotation.

SIR,—Under your Stock Market report of this date, you state the quotation for North Middlesex Gas 10 p.c. stock at 11⅜-12⅝. I think this must be an error, as the last quotation I had was £15 12s. 6d.

SHAREHOLDER.

Aug. 29, 1923.

Writing regarding the above, our Market Correspondent says: "The 10 p.c. shares have not been quoted at all for many months in the Stock Exchange Daily Official List, and I, in my report for the 'JOURNAL,' have followed the same course. The quotation of 11⅜, 12⅝ was intended for the 7 p.c. shares; but, by some accident, it appears to have got into the wrong line."

[We should like to point out to our correspondent that, though on this occasion we have broken the rule not to notice anonymous communications, in future we must adhere to it.—ED. G.J.]

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New Company.—Among the new Companies registered, we note one in Essex—the Bures and District Gas Company, Ltd., with a capital of £8000 in £1 shares (£2000 preference).

Belfast's Cheaper Gas.—The Belfast Corporation Gas Committee have recommended a reduction of 4d. per 1000 c.ft. in the price of gas. The new scale, after deduction of 20 p.ct. allowed on accounts paid within a month, will be: Lighting, 2s. 4d. per 1000 c.ft.; power, 2s.; slot-meters, 30 c.ft. per 1d. The lowest price for gas paid to 1914 was 1s. 6d. per 1000 c.ft.; the highest ever charged was 3s. 8d. net, in March, 1923. The reduction now announced has been made possible by the acquisition of the North of Ireland Chemical Works, and the successful working of residual products.

The men employed at the Longford Gas-Works went on strike last week following the decision of the Company to dispense with two of their number owing to slackness of work.

According to the monthly report of the Gas Manager, presented for the period ended July 31, over 29,000,000 c.ft. of gas were made at the Oswaldtwistle gas-works. This is an increase of 1,829,000 c.ft.

At the Cheltenham Police Court last Thursday week, Sidney H. Biston was charged with stealing £2 5s. 6d. out of the Gas Company's prepayment meter fixed in his house in Townsend Street. He was fined 40s.

The evening chemistry classes at the Birmingham Municipal Technical Social this session include special classes in gas supply and engineering chemistry; and there are the usual first and second grade classes in gas fitting.

The annual abstract of accounts for the Barnoldswick gas undertaking shows a gross profit for the year of £9785, against a gross loss last year of £2716; the net profit being £5738. Interest and sinking fund absorbed £4047; and after meeting all charges, £941 of the revenue surplus has been placed to the reserve fund.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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JOHN H. CHEW,
Acting Engineer and Manager.

Gas Office,
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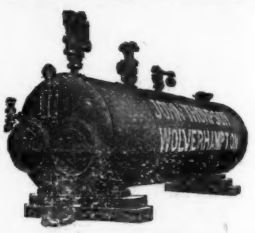

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